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COMPUTERWORLD

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Investors sue after STC ices CPU project

SAN FRANCISCO — Storage Technology Corp.'s recent cancellation of a project to develop an IBM-compatible processor resulted in the filing in federal court here last week of a class action suit charging the company with securities fraud and racketeering.

The suit, filed by the Chicago law firm of Katten, Muchin, Zavis, Pearl & Galler, charges STC with stock fraud and seeks actual damages of $10.6 million and punitive damages of $20 million. It also seeks unspecified additional damages that may be tripled under the provisions of the federal Racketeer Influenced and Corrupt Organizations Act, a statute generally used by the federal government to prosecute organized crime figures.

Donald E. Egan, the attorney who filed the suit, charged that STC had created a partnership to finance the processor project and, four months before canceling the project, obtained $10.6 million from 181 new limited partners who were given "written statements and misrepresentations of material facts that were untrue or misleading."

Also named in the suit was the investment firm of Smith, Barney, Harris, Upham and Co.

STC killed the project to develop a high-performance, IBM-compatible mainframe after citing technological problems and increasing cost estimates [CW, Feb. 6].

At press time, STC had no comment.

Supermini hits campaign trail with Cranston

By James Connolly
CW Staff

WASHINGTON, D.C. — What may be the most sophisticated in-house computer system ever used by a presidential candidate is helping U.S. Sen. Alan Cranston (D-Calif.) in his try for the Democratic nomination.

Cranston, ranked as low as sixth in polls that show him more than 40 percentage points behind former Vice-President Walter Mondale, apparently is the only one of eight candidates to use a minicomputer and the first to use a supermini in his campaign headquarters.

Like the competing organizations, the Cranston campaign uses computers for mass mailings of political and fund-raising letters, for scheduling and for income and expense reports for the Federal Election Commission. But while the other campaigns use service bureaus and in-house microcomputers, the Cranston for President Committee has a Digital Equipment Corp. VAX-11/750 in its headquarters here and DEC Rainbow micros in its New Hampshire and Iowa field offices.

"We made a decision well back in 1982 to go in-house," Alex Thurber, the committee's director of information systems, said. "A campaign doesn't have the time to wait for someone else to do its processing. We

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M&D offering tool to build applications

By Paul Gillin
CW Staff

NATICK, Mass. — McCormack & Dodge Corp. last week continued its foray into the systems software market by releasing as a package the system development software used to build its Millennium application series.

Millennium:SDT can be used to build IBM CICS applications that are fully integrated with mainframe-based M&D Millennium applications, including general ledger, fixed assets, human resources, accounts payable, purchase order and capital project analysis.

The package incorporates both interpretive and generative capabilities as well as reusable code, M&D said. Application definition is accomplished by creating data base records for files, records and fields, screens, queries and search fields.

M:SDT programs can call literals, variables and parameters and map them directly to the screen, eliminating CICS mapping and security, according to an M&D spokesman.

M:SDT uses M&D's procedure definition language, Millennium:PDL, to access and process data within the data bases. M:PDL uses an English-like syntax and arithmetic and logical operators to execute complex expressions.

On-line features offered with M:SDT and all Millennium products include multi-

See **M&D** page 6

PROFILE

He heads 'two-in-one' department

By James Connolly
CW Staff

SMYRNA, Tenn. — Logic says it is a mismatch, a marriage in which the partners have little in common and little to say to each other.

But Nissan Motor Manufacturing Corp. U.S.A. says that upon closer inspection, the "mismatch" makes sense.

Nissan merged its information systems with its purchasing department.

The apparent illogic lies in the fact that the departments cover so little common ground. But "we put the two groups together because they don't go together," emphasized Robert A. Frinier, who became vice-president of purchasing and information systems on Jan. 1.

"We think we figured out a way to have systems report to a division where it can be run without bias," Frinier explained. "Purchasing in this facility doesn't place much of a demand on the [DP] systems, at least much less than finance or production control. Our consultants said the systems organization needs a place where it can get top-level support and not be biased by the person in charge being primarily responsible to other areas."

That bias, he noted, could result in a department head tailoring information systems to his own needs at the expense of other departments or paying too little attention to information systems.


Frinier

"We think this concept might knock the computer industry on its ear," according to 42-year-old Frinier, who has a background in production control. Formerly with Ford Motor Co. in Michigan, he has been with Nissan since 1980, working with system users in production and with consultants and technical personnel in developing flowcharts for system interfaces between the new facility here and Nissan's headquarters in Japan.

Frinier heads a department of 70 people, some of whom previously worked in information systems when it was controlled by the Finance Division. Responsibility for information systems was shifted from the Finance Division on Jan. 1, at a time when company President Marvin

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TOP OF THE NEWS

Victor Technologies, Inc. has earned the unhappy distinction of becoming the third microcomputer maker in six months to file for protection under Chapter 11 of the Federal Bankruptcy Code. **Page 2.**

■

The Federal Communications Commission modified access surcharges for Foreign Exchange and Wats users, but retained the $2/mo and $6/mo fees per line for Centrex-CO. **Page 2.**

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Digital Equipment Corp. has become the first major computer vendor to enter the off-site storage and recovery business. **Page 4.**

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DP salaries are up sharply from six months ago, a recruiting firm reported. **Page 9.**

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Supercomputer maker Denelcor Corp. has jumped on the Unix bandwagon. **Page 69.**

■

The Goodyear Blimp is not the only big thing for which the company could become famous. Goodyear Aerospace Corp. researchers claim they have developed a computer system with the fastest I/O rate in the world. **Page 99.**

■

NEWSPAPER

Victor petitions for Chapter 11

Third micro maker in six months to file

By Patricia Keefe
CW Staff

SAN JOSE, Calif. — Bowing to pressure from its many creditors and several lawsuits, Victor Technologies, Inc. last week voluntarily filed for protection under Chapter 11 of the U.S. Bankruptcy Code.

With an estimated $70 million in unsecured debt, Victor became the third microcomputer maker in six months to seek court protection.

Victor said its manufacturing unit, which is also named Victor Technologies, Inc., has consented to a separate, involuntary bankruptcy petition filed last week in federal Bankruptcy Court here by six creditors, whose unsecured claims total over $12.8 million. The latter petition sought to force the California-based manufacturing unit into Chapter 11, where it could reorganize and work out a debt schedule under court protection from creditors' lawsuits.

According to a statement released by Victor, two other units also filed voluntary petitions: Victor United, Inc., the U.S. distribution subsidiary, and Victor Technologies International Sales Corp.

The vendor's European and Canadian distribution operations are insulated against claims against the U.S. entities, Victor said.

Victor has reached an agreement with its largest secured creditor, Security Pacific National Bank, under which the bank will finance "near-term manufacturing and distribution needs," a spokeswoman for Victor said. That agreement is subject to approval by the Bankruptcy Court.

Victor said it will continue to supply an adequate amount of computers to its U.S. and foreign distribution outlets.

As part of a restructuring of operations, Victor has terminated 300 employees in the U.S., leaving approximately 570 employees worldwide, the spokeswoman said. Victor declined to comment further.

Second suit

Another suit filed last week, this one by the advertising and public relations firm of Doyle Dane Bernbach International in federal Bankruptcy Court in Manhattan, seeks $8.3 million — $3.3 million for services performed (media buying) and $5 million in damages. That suit accuses Victor of providing false financial statements that overstated the micro maker's true worth and failed to disclose losses suffered in 1982, according to spokesman Robert Frost. The suit also names as a defendant Kidde, Inc., which owns a majority share of Victor, and Kidde President Fred R. Sullivan.

Victor has had a tough two years financially, suffering losses of approximately $3 million in 1982 and $47 million to date in fiscal 1983. Its overall debt reportedly tops $100 million.

The Chapter 11 filing highlights the failure of a creditors' committee established in late 1983 to help Victor devise a plan for paying a debt then estimated at $90 million. Negotiations between Kidde and the committee reportedly broke down, resulting in a successful bid to force Victor into Chapter 11.

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Runyon installed new vice-presidents for product control, engineering and planning and finance as well as for purchasing and information systems.

The highly automated plant has been producing an average of 7,000 light trucks a month since beginning production last June, according to Frinier.

"I don't have a very strong computer background from a technical point of view," the Nissan executive acknowledged.

He noted, "Initially, I'm spending 80% to 90% of my time on information systems, learning as fast as I can.

"I have people working for me who have been with information systems for a while. So they're teaching a newcomer," he said.

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Access fee cut for Wats, kept for Centrex

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The surcharges for accessing the dial-up telephone network will remain the same for Centrex-CO (Central Office) users, but the surcharges for Wats and Foreign Exchange services will be modified, the Federal Communications Commission ruled earlier this month.

Immediately afterward, Jack Smith, chief of the FCC's Common Carrier Bureau, indicated he is still hoping for some reduction in AT&T's upcoming long-distance rates. He said he "would like to see something in the neighborhood of" a 5% to 8% reduction in the proposed rates for Message Toll Service (MTS).

The FCC's latest action on its access surcharge plan was taken at a Feb. 3 meeting. Specifically, the commissioners:

- Reaffirmed an earlier decision under which Centrex-CO users whose systems were in place or on order as of July 27, 1983 will pay an access surcharge of $2/mo per line, while those using newer systems will pay $6/mo per line. The fees will begin April 3 and continue until sometime in 1985 when, depending on the outcome of an upcoming FCC study, they may be altered.
- Converted the closed end of each Wats line from an interstate to an intrastate facility. Under the earlier scheme, a user would have paid a direct charge of $25/mo per line termination beginning April 3. Now the user will pay the local telephone company a maximum $6/mo per line access surcharge, plus a varying amount to AT&T based on Wats usage. The FCC anticipates, however, that the latter fee will be absorbed rather than passed on by the phone company, a spokesman said.
- Restructured Foreign Exchange access surcharges so that at least some users of this service will pay less.

The commission decided that a telephone operating company providing local exchange facilities at the "open" or remote end of a Foreign Exchange circuit can charge only 45% of the MTS/Wats access fee rather than an equivalent amount. Although this change will tend to drop Foreign Exchange rates below what they would have been, the total bill is likely to go up significantly when compared with present rates because of pending increases for jurisdictionally interstate short-haul Foreign Exchange access circuits.

However, rates for similar long-haul circuits of 25 miles or more generally have not been increased and in some cases have been lowered, the spokesman said.

One problem that remains to be resolved, the spokesman added, involves local telephone companies not equipped to meter usage. In the past, they have charged each Foreign Exchange user for 4,400 min/mo of use, which forced those with lower calling volumes to subsidize those with higher volumes. The commission is studying this problem and a decision is imminent, the spokesman said.

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DEC enters records management business

By Bill Laberis
CW Staff

Eyeing a potential $2 billion-plus market, Digital Equipment Corp. is slated to announce today that it is diving headlong into the records management business, the boldest such move to date of any major computer vendor.

DEC has committed an undisclosed but obviously substantial capital investment to state-of-the-art facilities in Burlington, Mass., and will open similarly sized facilities in Chicago, Los Angeles and Toronto by midspring.

The company will open an additional 20 off-site storage and recovery facilities during 1985 and another 17 the following year, giving the company the most extensive records management network in the industry. The 41-site network will place a DEC facility within driving distance of more than three-quarters of the major DP shops in the U.S., the company claimed.

"Our commitment is national. We see a very large vacuum in this area, and users are rapidly awakening to the need for such services," said David B. White, national marketing manager for DEC's Record Management Services, headquartered in Stow, Mass. "It's a question of demand-pull, and that demand is getting much stronger."

Records management and off-site storage, White said, is not practiced as a very sophisticated art at many DP shops. Storage and protection of vital tapes and disks often consists of placing the material in an on-site cabinet. White cited one Boston-area information manager who protected vital disks by taking them home at night and locking them in her bedroom closet.

"A study we undertook showed a U.S. market for off-site records storage of about $2 billion annually," said David L. Early, DEC's Records Management Services manager. "We also found there are no vendors operating in all major U.S. cities, which we will."

Early said that about half the existing market is serving its own storage needs, including those DP sites that store records in cabinets and closets. Only about 15% of the potential market is being served by outside records management vendors.

CW photo by B. Laberis

White

DEC is banking on users becoming more aware of potential disasters that could cripple both DP and corporate operations if adequate off-site storage and backup is not provided.

Through a series of seminars being conducted around the country, DEC is trying to convince DP managers that extra care should be taken to protect corporate information assets and that this extra care should be extended to off-site storage. DEC is initially targeting users in high-transaction environments, such as banking, hospital and computer-aided design and manufacturing shops.

DEC's Burlington facility is equipped with massive, climate-controlled vaults for storing either paper, hard disk or tape records. Individual records are identified only by bar coding. Each vault is protected by six levels of security before entry can be gained, and each can store 200,000 disk packs or 157,000 tapes.

The location, type and processing requirements of each record are controlled by an in-house VAX-11/750 superminicomputer paired with a series of DEC RM05 disk drives. The site, identical to the others planned for DEC's network, will feature tape and disk reconditioning equipment.

Honeywell drops some DPS 8, DPS 88 purchase prices

PHOENIX — Honeywell, Inc. recently dropped the purchase price on most of its DPS 8 and DPS 88 mainframes, lopping off as much as $200,000 from the price tag of some models. Lease and rental prices were not affected.

Highlights of the price-cutting announcement include:

- Reductions of up to 20% on DPS 8/70 and DPS 8/62 processors using the firm's Gcos, Multics and CP-6 operating systems.
- A 12% reduction in the purchase price of add-on processors for the DPS 8/70, DPS 8/62 and DPS 8/49 lines.
- Price reductions ranging from 32% to 58% for upgrades on some DPS 8 models and reductions of 20% on memory upgrades for the entire DPS 8 and DPS 88 mainframe lines.
- A 30% reduction in monthly maintenance fees for some DPS 8 models.
- An extension of the warranty on all DPS 8/52, 8/62 and 8/70 processors from 30 to 90 days.

All of the price changes are in effect now, a spokeswoman said. For example, the purchase price of a DPS 8/62 CPU running under the Gcos operating system was cut $130,000 and now costs $550,000. The DPS 8/62M, which uses Multics, was reduced from $725,000 to $595,000, and the DPS 8/62C (the CP-6 version) was reduced from $825,000 to $695,000.

Honeywell's top-of-the-line DPS 8/70 was reduced $200,000. A central system using the Gcos operating system now costs $700,000. The Multics and CP-6 versions of the system were also reduced by $200,000; the 8/70M costs $750,000, and the 8/70C now costs $800,000, the spokeswoman said.

The prices of additional processing units for the Gcos, Multics and CP-6 versions of the 8/70 were cut 12%, from $655,000 to $575,000. The price of an additional processor for the DPS 8/62 was cut by 5%; it now costs $475,000.

The purchase price for the DPS 8/49 and 8/49C processors was dropped from $175,000 to $135,000.

The cost of migrating to larger configurations of the DPS 8 line was cut by as much as $30,000. As an example, the Honeywell spokeswoman said, an upgrade from a DPS 8/47 to an 8/49, which formerly cost $52,000, now costs $22,000.

The price cuts were made by Honeywell's Large Computer Products Division, P.O. Box 800/a-79, Phoenix, Ariz. 85066.

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like to have some lead time when we're working on a project, and a service bureau doesn't always allow you that."

Moreover, Thurber said, "the cost isn't comparable. It would be two or three times more expensive for us to go outside."

Cranston's system has 10 DEC VT102 terminals and two DEC LN01 laser printers. The printers produce 36,000 pages of letters and reports each week. Leased for $10,000 per month, the system includes 4M bytes of internal and 500M bytes of disk storage.

The committee's Issues Department uses the system as a word processor to develop position papers, usually drawing on stored reference materials that Cranston has built up as a senator.

Two terminals are used to process response mail, requests for position papers, campaign literature and campaign materials such as buttons and bumper stickers.

The scheduling office uses two terminals not only to coordinate the candidate's schedule, but to compile the two or more screens of data he will need for each personal appearance.

That data includes a crowd profile for political and security purposes and a list of the type of questions the candidate might be asked. The office also gathers similar materials for VIPs who might substitute for Cranston.

Other terminals are used by the campaign treasury, which compiles monthly reports for internal and FEC use on funds raised and expenses. The system tracks contributions to determine if they qualify for federal matching funds or if a contributor may have exceeded the legal limit. The data base for the fund reporting uses 50M bytes of storage and has names and other information for 31,000 active contributors.

The final two terminals are used for direct voter contact, compiling mass mailing letters and envelopes that are assembled and shipped by an off-site mail service and for updating telephone lists for the phone banks in field offices.

At any given time, the telephone banks may have access to 300,000 names of probable voters, caucus attendees and people whose backgrounds indicate they might support a Cranston candidacy. Those lists are forwarded to field offices in New Hampshire, Iowa and other early primary and caucus states. There, telephone interviews narrow the lists to identify the people Cranston targets, and the results are recorded on magnetic tape for entry into the headquarters' computer.

The people on the new list are then targeted for follow-up letters, which are sometimes personalized to reflect the concerns that were discussed with the telephone workers days before.

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"IDMS/R represents a major advance in database technology."

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David Litwack is Cullinet's Vice President of Product Development. Mr. Litwack has contributed significantly to the many technical advances Cullinet has achieved in database software products, including IDMS/R. Mr. Litwack joined Cullinet in 1976. He is a Cum Laude graduate of Brandeis University and holds a Masters in Computer Science from Boston University.

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IDMS/R Seminar cities and dates

City & State	Date	City & State	Date	City & State	Date
Albany, NY	Mar 13	Indianapolis, IN	Feb 21	Omaha, NE	Mar 1
Allentown, PA	Mar 1	Indianapolis, IN	Mar 27	Orange County, CA	Mar 6
Atlanta, GA	Mar 28	Jackson, MS	Mar 15	Oshkosh, WI	Feb 28
Arlington Hts., IL	Feb 23	Kansas City, MO	Feb 22	Ottawa, ON	Feb 21
Augusta, GA	Mar 14	Knoxville, TN	Mar 28	Pittsburgh, PA	Feb 29
Baltimore, MD	Feb 21	Lexington, KY	Mar 30	Portland, ME	Feb 21
Bloomington, IL	Feb 21	Little Rock, AK	Mar 13	Portland, OR	Mar 15
Boston, MA	Mar 8	Los Angeles, CA	Mar 27	Providence, RI	Mar 22
Boston/ Westwood, MA	Feb 23	Louisville, KY	Feb 16	Quincy, IL	Feb 29
		Madison, WI	Mar 15	Raleigh, NC	Mar 20
Bridgeport/ New Haven, CT	Mar 6	Meadowlands, NJ	Mar 7	Rochester, NY	Mar 28
		Memphis, TN	Feb 23	Sacramento, CA	Feb 21
Charleston, WV	Feb 29	Merrimack, NH	Mar 29	Salt Lake City, UT	Feb 21
Charlotte, NC	Feb 23	Miami, FL	Feb 16	San Antonio, TX	Mar 15
Chicago/ Rosemont, IL	Mar 20	Milwaukee, WI	Mar 7	San Diego, CA	Feb 23
		Minneapolis, MN	Mar 28	Springfield, IL	Mar 5
Cincinnati, OH	Mar 21	Montreal, PQ	Mar 14	Springfield, MO	Mar 29
Cleveland, OH	Mar 28	(French)		Spokane, WA	Mar 28
Columbus, GA	Feb 28	Montreal, PQ	Mar 21	Tallahassee, FL	Mar 1
Columbus, OH	Mar 9	(English)		Toledo, OH	Feb 24
Davenport, IA	Mar 13	Nashville, TN	Feb 16	Toronto, ON	Mar 20
Des Moines, IA	Feb 16	New Orleans, LA	Feb 23	Tucson, AZ	Mar 20
Detroit, MI	Mar 14	New York, NY	Feb 22	Vancouver, BC	Mar 14
Ft. Lauderdale, FL	Mar 22	New York, NY	Mar 20	Washington, DC	Mar 8
Ft. Wayne, IN	Mar 6	New York/ Long Island, NY	Mar 27	Wichita, KS	Mar 8
Ft. Worth, TX	Mar 15			Wilmington, DE	Mar 27
Grand Rapids, MI	Mar 27	New York/Rye, NY	Mar 13	Winnipeg, MB	Mar 6
Greenville, SC	Mar 6	Oakland, CA	Mar 13	Worcester, MA	Feb 16

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NEWS

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less query, multilevel security, screen building and Auditrack, which maintains a history of file maintenance transactions.

The product substantially reduces I/O by creating a separate record, which includes screen formats, the spokesman said. "Once a screen is formatted, a call is issued for the data rather than the screen specifications," he explained. Data is reformatted and normalized before loading into the application.

Millennium builds a component that summarizes the screen format, bypasses CICS mapping and allows the entire screen to be retrieved as one component. "There is only one I/O and one normalizer," the spokesman noted.

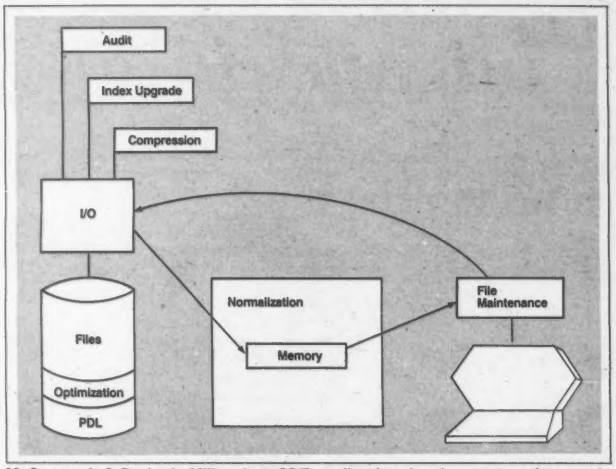
PDL uses macros to allow subroutines from Cobol or PDL programs to be loaded and linked into M:SDT applications, according to the vendor. A normalizer checks the data dictionary to handle field discrepancies within programs, and an on-line logic tester checks the logic to ensure that the code is executable.

When the program compiles, it is "normalized" as a single record, which reduces program size, the spokesman said. For example, the company's G/L Plus package consumed 900K bytes of virtual memory in its original form, but occupies only 700K bytes after normalization.

A separate index called a "key file" resides on the host and maps back to the physical data. Data can thus be presented in any logical view desired by the user.

M:SDT can be used either to develop new applications or to modify existing on-line or batch applications, according to John Landry, senior vice-president of research and development. "Millennium doesn't know one of our applications from somebody else's," he said. "It gives you the ability to retrofit existing applications using standard [IBM] Vsam files. You can be processing on-line general ledger and jump to batch, and Millennium doesn't know the difference."

M:SDT also incorporates a "screen hold" feature, which lets the user suspend a dialog with one application, start a dialog with another application and return to the original dialog. Up to 99 such "pages" can be initiated and suspended concurrently.



McCormack & Dodge's Millennium:SDT application development environment

Software developed under M:SDT is also fully compatible with M&D's Interactive PC Link connection between the IBM Personal Computer and the mainframe. Requests can be defined on the Personal Computer and data downloaded and uploaded from mainframe applications.

Available immediately, M:SDT licenses for $90,000 from M&D, 1225 Worcester Road, Natick, Mass. 01760.

ANALYSIS

M:SDT signals M&D attack on 'total solutions' mart

With its announcement of Millennium:SDT (M:SDT), a systems development tool, McCormack & Dodge Corp. (M&D) has clearly stated its intention to attack the "total solution" market already targeted by a number of systems software vendors.

The release is the company's third announcement in the past 13 months centered around Millennium, a development tool that uses a data base approach to build integrated applications.

By releasing Millennium as a product, M&D is taking a tack similar to that of Cullinet Software, Inc., which writes applications in its own Application Development System/On-Line development product, and Hogan Systems, Inc., which offers Umbrella, the development system it used to build its line of applications.

M&D officials believe the company is better positioned to attack the systems market than are vendors that are tied to an older generation data base management system (DBMS) on which applications are built.

The company's Millennium development environment is organized around the inverted list DBMS, an architecture that is gaining popularity because it can offer a variety of logical user views while still providing for easy mapping through the data elements. In an expensive development effort, M&D is gradually rewriting nearly all of its applications using Millennium.

M:SDT is not intended to be sold stand-alone for customers not using M&D applications. But that does not mean M&D will not offer stand-alone systems software in the future. M&D said a separate DBMS product is within the realm of possibility, and John Landry, senior vice-president of research and development, affirmed that the company is considering releasing a version of Millennium for IBM's Personal Computer XT/370 for use primarily as a development tool.

Sperry to teach quality circles

PRINCETON, N.J. — Sperry Corp. is taking its internally developed quality circles program public via two five-day facilitator training sessions scheduled for Feb. 27-March 2 and March 26-30 at the Nassau Inn here.

The program was developed by Sperry's Computer Systems Education Center and facilitators throughout the company. It consists of three levels of training, including special programs for facilitators, leaders and group participants.

A quality circles facilitator trains the leaders and acts as a coach, communicator and overall coordinator of the circles.

The sessions run from 8 a.m. to 5 p.m. Registration for both training sessions is limited to 24 participants. Each session costs $795, which includes handouts and manuals, but not hotel accommodations.

More information is available from Sperry through P.O. Box 1110, Princeton, N.J. 08540.

The problem you may not know you have

There is a bug in every Cobol program in your library.

You probably don't know about it, and you almost certainly haven't had to worry about it yet. But when it shows up, it will hit your entire shop, reducing data entry procedures to a mush of error messages.

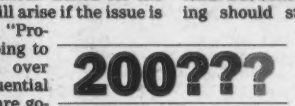
By Paul Gillin
CW Staff

NOVI, Mich. — When systems analyst William Schoen has presented DP managers with that pitch, he has understandably piqued their interest. But he has had trouble getting them to take his case seriously when they find out what the bug is.

The problem is the year 2000. The turn of the calendar presents a procedural issue that is acknowledged occasionally in trade conference jokes and DP shop banter but has attracted little serious attention in the industry.

The root of the issue is the industrywide standard of using two-digit date fields in Cobol programs. Error-checking procedures typically rely upon dates proceeding sequentially, with one year's date being greater than that of previous years.

However, programs will be thrown for a loop after the turn of the century when they have to cope with the two-digit date field "00" being greater than "99." Schoen ticked off the problems that will arise if the issue is not dealt with: "Program logic is going to malfunction all over the place. Sequential data processes are going to abend. A great many on-line modules won't accept the new dates because they include sequence checks. Most sorts won't work, and a great many literals won't work."



Perhaps understandably, the issue has received little serious attention from a DP community that is concerned with more immediate problems. But Schoen claims data processing should start paying attention now to the problem of making programs "year 2000-compatible" in order to avoid headaches when the time of reckoning draws near.

He rationalizes that most large firms maintain a library of thousands of Cobol programs, most of which have at least one date field. In addition, many of those programs have literals, sequence processes and error checks interspersed throughout, meaning that they will require modification in several places.

"You can't assume every date field has the word 'date' in it," Schoen said. "You also can't assume every field that looks like a date field is a date field. You're going to have to look at every program and figure it out."

For that reason, he said, the "black box" approach of simply running every program through a modification routine is impractical. Some date fields are bound to be missed.

See 2000 page 8

Manager gets 16-year jump on Cobol bug

TOLEDO, Ohio — Although he agrees that making Cobol programs "year 2000-compatible" is not an issue of immediate concern, a DP manager here has elected to become the first user of a set of subroutines designed to make the transition to the new millennium a smooth one.

Michael Ehrick, director of computer services at Libbey-Owens-Ford, Inc., became interested in preparing Cobol programs for the inevitable march of time after he received a direct mail advertisement from William Schoen, a systems analyst based in Novi, Mich.

Schoen's Charmar Enterprises, Inc. markets a product that addresses the problems that may emerge when the year 2000 arrives and plays havoc with date fields in existing Cobol programs (see related story). His product is "a subroutine that does some elegant arithmetic routines that let you compare date fields with two-digit years in such a way that the year '00' is greater than the year '99,' " Ehrick said. Schoen also offers an approach to sorting so that the same end is achieved, according to Ehrick.

Ehrick put Schoen in contact with Libbey-Owens-Ford's manager of application development. The company expects to begin including the subroutine in new applications as soon as the next development project is undertaken.

The subroutines are "nothing an advanced computer science major couldn't do," Ehrick said. But, he added, "a lot of creative thought went into this, along with a lot of dogmatism."

New Zip+4 rules ease access to discounts

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Postal Service (USPS) has issued new regulations to make it easier for mass mailers to obtain discounts by using nine-digit Zip Codes. The post office hopes the regulations will greatly increase participation in the new postal automation program.

The Zip+4 program went into effect late last year after several years of controversy. However, the hoped-for success of the program, designed to bolster USPS productivity through greater automation, has been slow in developing, in part because mailers have had problems converting their address files to the longer Zip Codes.

The new regulations, published Jan. 31, should make it easier for firms to qualify for the one-half cent discount for every piece of mail that carries a Zip+4 code while phasing in full conversion to the new numbers, according to USPS and postal experts.

Postal regulations allow mailers to obtain a three cent discount for each piece of first-class mail delivered to a post office in bundles presorted by five-digit Zip Codes. Before the rules were modified, 100% of those letters had to carry a nine-digit code in order to qualify for the additional one-half cent discount.

But problems with the computerized Zip+4 data base tapes available from USPS and private sources have made it very difficult to convert all files to the Zip+4 program.

These difficulties have not deterred the USPS from expanding its use of new automated reading and sorting equipment needed for the Zip+4 program. At a recent USPS Board of Governors meeting, postal officials said the machines are reliably sorting approximately 50% of the mail they handle — far above the break-even point, they said. The board then approved the next phase of equipment procurements, totaling $450.2 million in machinery.

The new regulations ... should make it easier for firms to qualify for the one-half cent discount for every piece of mail that carries a Zip+4 code while phasing in full conversion to the new numbers.

To prod more mailers to use the longer Zip Codes, the new postal regulations allow comingling of five- and nine-digit Zip Coded mail in presorted bundles of 500 letters. Only the letters with the nine-digit codes will qualify for the extra one-half cent discount but, on a temporary basis, mailers will not have to separate mail into the two presort categories.

By having to separate the two categories, mailers would have had to forfeit the three cent discount in order to qualify for a one-half cent discount, which understandably limited Zip+4 participation. Under the new rules, until Feb. 1, 1985, at least 85% of the pieces in the combined batches must have Zip+4 numbers. From then until Oct. 1, 1985, at least 90% must bear those numbers. Thereafter, no comingling will be allowed, and presorted five- and nine-digit Zip Coded mail must be bundled separately. Reacting to these changes, James E. Pehta, vice-president of List Processing Co., Lombard, Ill., said the rules will bring into the Zip+4 program many of the largest mailers, whose participation "is key to the success of the [Zip+4] program," but who have been "sitting on the fence" because of the problems they have had in qualifying for the discount.

Pehta, whose firm offers automated Zip Code services, is a member of the USPS Mailers Technical Advisory Committee, which represents private sector views to the agency and which helped to develop the new regulations.

According to Pehta, of the 67 billion pieces of first-class mail delivered in fiscal 1983, 13 billion were presorted.

About 4,000 of the largest mailers in the U.S. produce approximately 40% of the mail, he added.

Pehta predicted that as a result of the new regulations, the amount of mail with nine-digit Zips might hit two billion pieces in the first year, up from an estimated 300 million that could have been expected without the more relaxed regulations.

He also noted that the new regulations contain provisions mailers must follow to certify that their mail meets requirements of the new rules. These will help the USPS track use of the Zip+4 numbers.

The USPS can use this statistical data to support requests for even larger Zip+4 discounts, according to Pehta, who said a three to five cent discount for machine-readable Zip+4 coded mail within four to five years is possible.

Burroughs releases laser printer

DETROIT — The North American release of the first laser printer for Burroughs Corp. mainframes was announced by the company last week. The B9290-30, a 30 page/min intelligent laser printing system that operates on-line with Burroughs systems, was first introduced in France seven months ago.

The B9290-30 is compatible with Burroughs B2900, B4900, B5900, B6900, B7900 and the recently released B9 mainframes. Running in a continuous print mode, the laser printer reportedly operates under both printer and host system software control.

Burroughs said the printer allows flexibility in the design of printed forms (printing logotypes and signatures), the placement of data on the forms and the assembly of completed reports. Images are created by a laser diode with a resolution of 57,600 dot/sq in.

The B9290-30 can print on two sides of uncoated, 8½- by 11-in. plain bond paper in either the portrait (standard text) or landscape (columnar) format with no loss of speed and completely collate and stack completed reports in distribution order, the vendor said.

The B9290-30 is priced at $65,000 from Burroughs, 1 Burroughs Place, Detroit, Mich. 48232.

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The only real solution is to write all new programs to be year 2000-compatible.

Not surprisingly, Schoen has developed a method to do that. The Charmar Correction is a package consisting of two Cobol subroutines that can be inserted into new programs to resolve the problem. The $995 purchase price also includes an analysis of the problem and a methodology to deal with it.

Programs made to work

"They make programs work right, and they include directions to make sorts simple," he said.

Schoen has done some calculations to show why it makes sense to tackle the problem today. He figures it costs $300 to modify a program, and there is a minimum of 50 programs per programmer in the average corporate library. Assuming that half of those programs will need to be modified, that comes to a cost of $7,500 per programmer if the conversion is left until the last minute.

Based on scans of existing libraries, Schoen has decided that if firms begin implementing the changes now, by the year 2000 less than 2% of their programs will require modification. If they wait just six years to begin the process, the figure balloons to 25% to 30% of their library.

"Why should companies continue to write software that is not year 2000-compatible when it's just as easy to do it the right way now?" he reasons. Not many DP managers have bought his argument so far. He has been escorted out of buildings by security officers more than once, Schoen said.

Schoen's Charmar Enterprises can be reached through P.O. Box 702, Novi, Mich. 48050.

Recruiter says DP paychecks much fatter

Computing systems managers earning $41,500 to $66,800

By Peter Bartolik
CW Staff

MOUNTAIN VIEW, Calif. — Salaries in the computer profession are up sharply from six months ago, and there is an expansion in demand for various types of computer skills, according to a survey just released by Source EDP.

In its "1984 Computer Salary Survey and Career Planning Guide," the recruiting firm reported median compensation levels, along with high and low ranges, based on an analysis of more than 44,000 computer professionals who used the company's services during 1983.

"Salaries throughout the computer profession are on the rise, with most of the increase occurring during the last six months," the company reported. "In comparison with data available just six months ago, salaries are up sharply."

The report listed salary data for 11 nonmanagement positions at various levels of experience, four management positions at small, medium and large DP operations and three sales positions.

Changing technology

Changing technology is greatly impacting the hiring outlook for professionals in the DP industry, according to the report. "While it was once cost prohibitive for smaller companies, today, sophisticated computing power is being realized by even the smallest business establishment," according to Source EDP.

At the same time, "Large corporations are finding more uses for computing." The implications for career planning are twofold, according to the report: "Professionals in the user environment should broaden their exposure to such areas as distributed processing, end-user information center products, networking and communications in order to stay in the mainstream of career development."

Secondly, "new opportunities will develop in key disciplines within vendors of mini and microcomputers in the areas of software development, commercial and scientific systems development, programming, marketing and marketing support and within service organizations that support manufacturers' systems by providing time-sharing, turnkey applications, consulting services and more."

The report also said the career opportunities in the area of industrial automation may be the most exciting as the shift to automation, "only in its infancy," increases demand for computer-aided design and manufacturing systems designers and programmers and others.

Median salary ranges

Median salary ranges for managerial positions at small to large operations, Source EDP said, are: technical services managers, $40,800 to $54,900; systems and programming managers, $40,800 to $51,300; operations managers, $29,000 to $42,000; and computing systems managers, $41,500 to $66,800.

The highest median salary level for computer professionals in nonmanagerial positions and with two years' or less experience was $29,100 for systems programmers, closely followed by data communications programmers and programmer analysts at $28,800 and data base specialists at $28,400.

Other nonmanagerial positions with two years' or less experience were senior analysts, project leaders and consultants, $26,200; DP auditors, $25,500; software engineers, $25,300; mini/micro programmers and programmer analysts, $22,000; engineering/scientific programmers and programmer analysts, $21,100; commercial programmers and programmer analysts, $20,800; and computer operators, $15,000.

Median salaries for those positions with more than four years' experience (six years for software engineers and senior analysts) were data base specialists, $42,300; systems programmers, $41,500; senior analysts, $41,400; data communications programmers and programmer analysts, $40,700; DP auditors, $40,300; software engineers, $38,200; mini/micro programmers/analysts, $36,600; engineering/scientific programmers/analysts, $35,100; commercial programmers/analysts, $33,800; and computer operators, $23,700.

Median salaries for sales positions ranged from $25,000 for sales/technical support representatives with one to two years' experience to $55,300 for sales managers.

Source EDP's report is available free to computer professionals from Source EDP, Department DX-400, Box 7100, Mountain View, Calif. 94039.

Little fear of DP glitches on 'Challenger'

IBM diagnoses 'Columbia' malfunctions to prevent recurrence

By Peter Bartolik
CW Staff

CAPE CANAVERAL, Fla. — Despite the many problems experienced last week during the mission of the space shuttle *Challenger*, there was little fear that the computer malfunctions experienced during *Columbia's* previous mission would recur.

At the end of *Columbia's* mission in December, two of the four IBM Advanced System/4 Pi Model AP-101 computers shut down [CW, Dec. 19]. When the firing of thrusters aboard *Columbia* jarred the ship, the No. 1 computer shut down, and its guidance and navigation tasks were assumed by the No. 2 computer. Five minutes later, after another thruster firing, the second computer also shut down. That computer was restarted, but failed again during the landing.

Following the flight, IBM removed the computers and stripped them down to pinpoint the problems. Both failures were believed to have been caused by objects floating around in circuit boards and causing electrical shorts. IBM implemented an additional testing procedure to ensure the problems would not occur in the future.

In the No. 2 computer, according to a spokesman for the National Aeronautics and Space Administration (Nasa), "a microscopically small solder ball loose in one of the circuits escaped detection in quality checks. In zero gravity it would drift over and short out the circuits."

In the No. 1 computer that could not be restarted, "a small flake of gold-plated carbon, scrap from the circuit board, jammed into circuits and caused a permanent short."

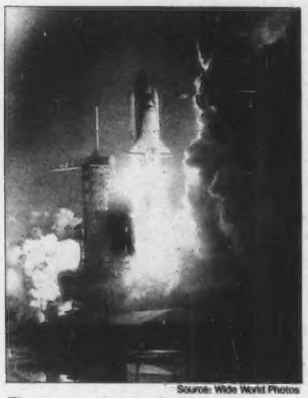
Joseph Melitano, spokesman for IBM's Space Shuttle Program, said the causes were "identified with a high degree of certainty," but not 100% certainty because during attempts to recreate the failures, the computers "did not re-short out."

Nasa spokesman Terry White said, prior to *Challenger's* launch, that there was little concern about a recurrence during the latest mission, even though *Challenger's* computers were not stripped down, because the computers aboard that shuttle "have flown on three previous flights with no problem at all." Melitano said the *Challenger* computers were subjected to standard tests.

According to Melitano, IBM has initiated additional testing procedures called particle impact noise detection (Pind). A "highly sensitive audiovisual system is placed against the computer, which is given a jolt to see if the [Pind] system can pick up any movement," he explained. "If [engineers] hear any noise, they'll take the component apart or even take the computer away."

During the Pind test, the computer components are vibrated and then shocked to determine if any objects are loose within them.

Equipment designed for use in space is designed to exacting military specifications and subjected to rigorous testing that has no comparison in the production of commercial equipment, Melitano said. "The equipment is built and tested to withstand the shock of lift-off and the heat of reentry and to operate in a weightless environment. Redundancy is the key ingredient. All these systems are designed to take the impact of any number of failures."



Source: Wide World Photos

The space shuttle 'Challenger'

Ifip schedules security meet

TORONTO — The International Federation for Information Processing (Ifip) has scheduled its second International Congress and Exhibition on Computer Security Sept. 10-12 here.

The theme of the congress will be "Computer Security — a Global Challenge." Sessions will cover computer security, contingency planning, data and facility protection and implications of systems security.

Registration costs $442 prior to May 30, $479 prior to July 30, $516 before Sept. 1 and $553 for late registration from the International Security Congress, Inc., 160 Duncan Mill Road, Don Mills, Ont., Canada M3B1Z5.

Failed orbit sinks use of $75 million satellites

By Lynn Haber
CW Staff

CAPE CANAVERAL, Fla. — Two $75 million communications satellites launched by the space shuttle *Challenger* failed to achieve orbit, rendering them useless as transmitters of voice, data, video and facsimile traffic.

Launched on Friday, Feb. 3, from *Challenger's* cargo bay, the *Westar VI* communications satellite, owned by the Western Union Co. of Upper Saddle River, N.J., ran into problems "some time late that afternoon," according to a spokesman from Western Union.

The second satellite, the *Palapa B-2*, owned by the government of Indonesia, failed to achieve proper orbit after it was launched last Monday, Feb. 6.

Both satellites were built by Hughes Aircraft Co. and were to be boosted into high Earth orbit by a payload assist module made by McDonnell Douglas Corp. Each satellite was insured for about $100 million.

According to a National Aeronautics and Space Administration (Nasa) spokesman, a malfunctioning booster rocket may have affected the proper positioning of the satellites. The *Westar VI* was supposed to have reached geosynchronous orbit — the point in space where the orbit of the satellite matches the rotational speed of the Earth — at an altitude of 22,300 miles.

The launching of the *Westar VI* was to have marked Western Union's first decade in space and the 10th anniversary of the first launch of a U.S. domestic communications satellite. The initial launch took place in April 1974. Western Union currently has four domestic communications satellites in space, the *Westar II, III, IV* and *V*.

The *Westar VI* was a 24-transponder C-band satellite, similar to *Westar IV* and *V*. As a future customer of *Westar VI* services, Vitalink Communications Corp., a three-year-old company partially owned by Western Union and General Electric Co., had purchased two of the transponders. Vitalink was "well insured" for the loss, a Vitalink spokeswoman said.

Vitalink currently leases two transponders on *Westar IV* and intended to move its customers from *IV* to *VI*. "In terms of Vitalink's operation, our customers will feel absolutely no interruption in service," the spokeswoman said. "We plan to extend our leases on *Westar IV*, and with our coverage for the space we owned on the *VI*, we will be pursuing the lease or purchase of new transponder space."

The spokesman for Western Union confirmed "business as usual" for customers on the existing four satellites. Some of the print media customers, which use the satellites to transmit facsimile communications traffic to their various regional printing plants from which local distribution takes over, include the *Wall Street Journal*, *U.S. News and World Report*, *Time*, *Sports Illustrated* and *People Magazine*.

According to a Western Union spokesman, the firm will explore ways to utilize its integrated satellite and terrestrial microwave network to handle the communications traffic slated for *Westar VI*. The firm is also exploring the possibility of leasing capacity from other carriers.

Construction and planning for *Westar VII* are already under way, with a projected launch date for fall 1985.

Because of the *Westar VI* launch failure, Western Union will attempt to move that date up, the spokesman said.

Will mishap hike insurance rates?

NEW YORK — The insurance industry is feeling repercussions from the failures to properly launch two $75 million communications satellites from the space shuttle *Challenger* this month.

The *Westar VI* communications satellite owned by Western Union Co. was insured for $105 million; Western Union had paid a premium of about $5.5 million for the policy. Alexander & Alexander Services, Inc., a New York brokerage company, was the underwriter for the policy, according to a Western Union spokesman.

The anticipated increase in the use of communications satellites and, therefore, the increased likelihood that other launches could go awry may elevate the cost of insuring such ventures, according to insurance industry experts.

The Western Union spokesman refused to speculate on how an increase in insurance rates would affect satellite customers. "I'd say it's premature to say what effect increases in insurance costs will have for us. This is a situation where we're just going to have to wait and see what happens in the future."

CW photo by J. Connolly

Air Force Staff Sgt. Lawrence Thompson operates Sperry 1100/60 at Langley Air Force Base.

Air Force launches Sperry pact

By James Connolly
CW Staff

HAMPTON, Va. — Installed under the largest commercial computer contract in history, a Sperry Corp. 1100/60 mainframe here at Langley Air Force Base last week became the first of 153 new U.S. Air Force computers to be fully operational.

The Langley system, like other Phase IV Program systems that will be installed at 118 air bases throughout the world, will manage base-level administrative tasks such as supply, maintenance, accounting, property inventory and personnel. The systems at the other bases are at various stages of installation, but Defense Department and Sperry officials said that all of the $480 million contract's 153 systems, which include regionalized primary systems and backups in some areas, will be operational by the July 1, 1985 target date.

Assistant Secretary of the Air Force Russell D. Hale, Sperry Corp. Computer Systems President Joseph J. Kroger and Gen. W.L. Creech, commander of the Tactical Air Command, headquartered here, officially opened the Langley computer room last week.

At Langley, chosen for the first installation because the Air Force felt it was typical of large air bases, the 1100/60 is located on the first floor of a three-story red-brick building. But throughout the 400-acre base are some 400 Sperry UTS-40 terminals and printer-terminals linked to the mainframe.

Those terminals will be used by personnel in various departments and air wings to order supplies, keep maintenance records on aircraft and handle other administrative tasks.

"With this system," Hale said, "supply people for once in their lives are going to be able to understand their roles, how they fit in." It is the Air Force's first true distributed data processing, he added.

Hale stressed that it is crucial for the Air Force to be able to manage spare parts and maintain its aircraft and that base-level supply is more important to the Air Force than to other services because only the Air Force fights from its home bases.

Hale cited the fact that the Air Force uses 57 different types of aircraft engines as an example of the supply problem's complexity. The computers will be used to track the thousands of spare parts needed. They will also track fuel supplies, munitions and ground vehicles.

In addition, the processors will maintain personnel, medical and payroll records for more than 10,000 military and 1,200 civilian employees at Langley.

The base is home for the 48th Fighter Interceptor Squadron and various airlift, communications, training and support groups, both active and reserve.

Nineteen configurations

The 1100/60, which will be installed in 19 different configurations at the different bases, replaces a combination of Burroughs Corp. 3500 and Sperry 1050 mainframes purchased in the 1960s. Those 277 systems are scheduled to be replaced by an average of about 10 of the 1100/60s per month.

Implementation of the Phase IV Program involves converting 320 software systems that are unique to the Air Force and hundreds of other programs that are unique to individual bases or commands.

Sperry won the eight-year contract a year ago after a head-to-head "compute-off" that pitted Sperry against Burroughs in a 26-month contest to determine which company and system could best convert 1.5 million lines of Air Force software at the lowest price. The contract could soar to more than $1 billion by the year 2002 if Sperry wins two six-year extensions, which Hale noted could involve major upgrades in the systems.

"This system is upward growth-compatible. If Sperry comes out with a new whatever, we can integrate it into our system. It's a system for the 1990s," he said. In addition to the 153 mainframes, the contract calls for Sperry to supply 7,000 terminals by July 1985 and a total of 20,000 terminals by the end of the contract.

In addition to the Air Force contract, Sperry's defense contracts include three pacts, worth more than $1.5 billion, to supply computers to the U.S. Navy and a $1 billion contract to provide electronics and weapons for six Canadian frigates.

DEC chief promises drastic price reductions

By David Myers
CW New York Bureau

NEW YORK — Buyers of Digital Equipment Corp. systems can look forward to "drastic" price reductions over the next year and a half, according to Kenneth H. Olsen, president and founder of what is now the second largest computer maker in the U.S.

Addressing stock market analysts here last week, Olsen said the overall cost of a computer system will not drop as steeply as the price of its central processing unit. However, the price drop-offs will be the steepest in DEC's 26 years of business.

"We never use the word 'price cutting.' We like to think we're the ones who introduce new technologies and new low prices," Olsen said when asked if DEC would lead prices downward for the rest of the computer industry. He added, however, that as "the cost of computing is coming down, people's taste for computing is on the rise. That's the compensating factor."

Olsen also told the analysts that DEC has recovered from its disastrous first quarter, when profits crashed by 72%. Second-quarter results, released a week before Olsen faced Wall Street, showed DEC's profits climbing once more, up 32% over the year-ago quarter.

The quick turnaround was caused by an internal change in the method of measuring sales success. "The change was insignificant," according to Olsen. "All we said is, 'We're going to measure you differently — by sales department rather than by product line.' "

The internal change also explained the management defections DEC suffered in the first quarter, Olsen said. "It made a few people who had been doing it the old way for 23 years unhappy. [Their leaving] really had little to do with what we went through in quarter one."

Not all analysts convinced

But not all analysts were convinced. Frederic H. Cohen of L. F. Rothschild, Unterberg, Towbin said recent top-flight emigres from DEC's engineering ranks had "not been replaced by equivalent people. Key people have a [financial] stake in [Data General Corp.] and have a reason to stay. That's not true at DEC. Why would the flow of people to other companies not continue?"

However, John J. McManus, an analyst at Bear, Stearns & Co., said DEC, "like IBM," is "ripe for the raiding. There are always going to be people leaving. We can't lose sight of their tremendous market share."

Olsen complained that critics of DEC had jumped all over the company after its first-quarter results were posted. "We should not be measured by our participation in the fast-growth, sometimes fast-decline segments of the industry," the DEC chief said.

"We have dull customers with dull applications, as opposed to robots and home computers and the like. But we like that market. It's challenging, but it's stable," he said.

In discussing product strategy, Olsen divided DEC's plans into three parts for the stock analysts:

■ DEC will continue to "concentrate on VAX," including the eventual appearance of "Venus," the high-end machine now five years in development. In addition, the two-board Microvax I is due to appear later this year with the single-chip Microvax II to follow in 1985.

Olsen

■ DEC will continue to "tie all our customers together through clustering," either "on the disk side" or through Xerox Corp.'s Ethernet network. All DEC equipment is now compatible, Olsen said, with some links to IBM and Wang Laboratories, Inc. hardware also having been forged.

■ Personal computers will continue to play "a large part in our systems," Olsen said. "The work will be highly shared between personal computers and the VAX." However, he noted that it will be "a long time before [the personal computer market] settles down."

Olsen also revealed that a "medium-size project" now under way at DEC is developing a "simple computer that goes very fast" and which is based on "a completely different architecture" than the rest of the Maynard, Mass.-based computer maker's line.

"All the uses for this we're not sure of yet," Olsen said, vowing the new machine would not become the company's "main line."

Olsen said the biggest problem faced by the No. 2 computer vendor is deciding which markets to remain a competitor in and which to abandon.

"Most of the challenges are our own. We believe it's too easy to blame your problems on the government — that's a good Puritan tradition," Olsen said.

NEWS

Bank's quality assurer has lofty goals

By Bill Laberis
CW Staff

BOSTON — Karen Jacobs said she was typical of a lot of young people during the 1960s, shunning any sort of goal orientation in favor of simply putting in her eight hours and going home.

But today, after 22 years with the same company, Jacobs' professional world is almost entirely goal-oriented. As quality assurance coordinator at the Shawmut Bank here, the 39-year-old Jacobs oversees a reporting system designed to ensure that the bank's DP shop meets service goals the shop helps develop, while ensuring further that users get what they need from the DP shop — no more, no less.

Trained initially as a clerk/typist and later as a budget specialist, Jacobs spent nearly 11 years in Shawmut's data center in various clerical and administrative capacities before moving up to quality assurance five years ago. Her move coincided with the bank's implementation of a performance appraisal system set up to monitor DP performance and productivity.

"I'm the liaison between EDP and the users, via the reporting system," Jacobs said in a recent interview. "The idea from the beginning was to open communication between EDP and the user. I think in the last few years here we've helped break down a common misconception that EDP people are untouchable."

Photo by P. Korzeniowski
Karen Jacobs

To accomplish such lofty goals as DP-user harmony, Jacobs said she first had to hone her own communication skills before applying them to two groups of people who in many shops mix about as well as oil and water.

"It helps to be a good organizer and to know the resources available to you when it comes to resolving a minor conflict before it becomes a major blowout," she said. "You have to be both firm and friendly, but most of all you have to be fair. It all sounds so simple until you try to practice on live subjects."

Jacobs gets plenty of opportunities to practice these days. She works with and monitors the performance of 43 applications serving dozens of users at the bank. Using the framework of a performance rating system developed by Darien, Conn.- based Mathews & Co. management consultants, Jacobs helps the users and DPers develop mutually acceptable levels of performance for the DP shop by drafting a written agreement signed by managers from both the user and DP communities.

Once the agreement is reached, it remains unchanged unless changes are again mutually agreed upon. For example, Jacobs used the Mathews system to help users develop performance measurements for Shawmut's demand deposit application, one of the bank's largest applications. She first gathered job control and human resource data from the computer control and scheduling people to determine what reports the application routinely generated and to whom they were sent and when.

Combining this information with data from the users, Jacobs then arranged a series of meetings with the two groups to work out definitive job schedules. The binding agreement that was finally hammered out dictates what users can expect and what DP should produce. She was also able to alert some users to the availability of reports of which they were not aware.

"Prior to implementing the system, some users needed their reports at 8 a.m.," Jacobs recalled. "Well, maybe they did and maybe they didn't. Using the system with our department in the middle, we have been better able to allow supervisors and middle managers among the users to determine needs vs. wants."

Jacobs said she maintains continuous contact with users, who rate the DP shop according to several criteria, including accuracy of reports, timeliness, on-line availability and response time. Each of the criteria has standards of performance attached to it. For example, to get a "highly satisfactory" rating for timeliness, the DP shop must have zero days of late output in one month, or one day for a "good" rating.

Apart from the enhanced cooperation between users and DP, Jacobs said the performance rating system has also given greater visibility to problems for senior management. In addition, the constant run of meetings Jacobs chairs often stimulates conversation about problems other than those immediately at hand.

"I stayed in the data center, mainly as a clerk, because I truly liked that part of the banking business," Jacobs said. "Now with this job, I feel I have gained back more in the last year in terms of professional development than I have in my lifetime."

Coping with AT&T split

Realign tech resource management: report

By James Connolly
CW Staff

BOULDER, Colo. — Budgeting an extra 10% for telephone service, studying bypass technologies and finding new means of managing the electronic office are ways for firms to cope with the AT&T divestiture and technological advances, suggested a report published last week by Cross Information Co., a consulting firm based here.

Corporations should not only plan for additional costs and personnel for telecommunications, but they also should examine how they manage all of their communications, computer and other technical resources, the report advised.

Cross recommended that financial modeling software be used to project changes in telephone rates and calling patterns; that companies appoint staff members to assume the responsibility of the AT&T network account manager; that managers budget a 10% increase in telephone rates and a 30% staff increase; and that companies save repair costs by using their own personnel to find technical problems.

The report called for companies to examine bypass technologies and outlined the strengths and weaknesses of cable television and the microwave, cellular and satellite communications industries as alternatives to AT&T and the regional telephone holding companies.

Another vote for Unix

Cross also suggested that companies convert all of their computer systems to AT&T's Unix multiuser system. "We believe Unix will become the world's computer operating system," the report said.

Corporations should not only plan for additional costs and personnel for telecommunications, but they also should examine how they manage all of their . . . technical resources.

A key to dealing with the rapid changes in technology and communications, according to Cross, is what the report called "virtual management." Under that system, managers use sales and marketing techniques within their own organizations to work with employees to integrate all aspects of the electronic office, including voice and data communications, computers, robots, biotechnology, energy management and ergonomics.

The report predicted government indifference to higher rates after the 1984 elections; delays in getting new products and services because of state and federal regulatory "logjams"; and AT&T and IBM pushing most small suppliers or new products and services from the marketplace.

It also foresaw additional features keeping private branch exchange prices from going down; AT&T continuing a long-range migration strategy of overpricing old equipment to steer customers to new products; poorer and more expensive service in rural areas; and cities raising taxes to fund telephone service for the poor and elderly.

The study recommended that companies prepare for delays in specialized services, with a three- to six-month delay in getting leased lines and repairs — once taking hours — taking weeks.

The 400-page report is available for $500 from Cross, a four-year-old consulting company specializing in telecommunications, located in Suite B, 934 Pearl St., Boulder, Colo. 80302.

Study looks at how AT&T can profit from services

BOULDER, Colo. — AT&T can profit from its long-distance service, new products and joint ventures — but not until it completes its reorganization and develops a marketing strategy, according to a study by Cross Information Co.

In examining the competition among AT&T, the seven former Bell operating companies and alternative communications industries, the consulting firm concluded that AT&T Technologies will continue to market new products, enter joint ventures in the U.S. and abroad and make its Unix multiuser system the "operating standard," thus "positioning itself to compete with IBM."

The report said that the Bell holding companies may see competition in heavily populated local calling areas, but that some lack the proven sales staffs and strategies to compete in markets such as private branch exchanges and long distance. According to Cross, the seven have one thing in common: the buying power of their "enormous resources," even after the parent company's breakup.

Cross noted that AT&T Communications remains viable in the long-distance market despite facing post-divestiture government regulation, such as the Federal Communications Commission allowing a $6 access fee for corporate phone lines while delaying access fees for small businesses and residences.

Long-distance competitors, such as MCI Communications Corp., will benefit when the holding companies later this year begin providing the competitors with the same access to trunk lines that AT&T enjoys, the report noted.

But that does not ensure success, according to Cross, which noted that other common carriers and specialized common carriers do not have the financial backing or technological breakthroughs to defeat AT&T. However, they do have innovative marketing techniques, the report said.

At the local, "last mile" level, the report listed cable television companies, local-area networks and cellular companies as competitors to the holding companies.

The cable firms lack penetration in the business district, understanding of DP and networking capabilities. But they can offer telephone directories, alarm services, electronic mail and other information services, the report noted.

Xpediter users to meet

SAN JOSE, Calif. — The national Xpediter Users Group Conference will be held Feb. 27-29 at the Sheraton-Fisherman's Wharf here.

Featured guest speakers will be Ned Chapin, chief consultant with Infosci, Inc. of Menlo Park, Calif., and Dr. Ed Miller, technical director with Software Research Associates of San Francisco.

Xpediter is an automated testing and debugging tool used by Cobol programmers for applications ranging from program development to program maintenance.

Delegates from the host company, Application Development Systems, Inc. (ADS) here, and from the user community will discuss a variety of topics, including Xpediter testing techniques and future product developments.

The registration cost is $150 for the first registrant and $125 for each additional registrant per company.

More information is available from ADS, 1530 Meridian Ave., San Jose, Calif. 95125.

Local-area net seminar set

ARLINGTON, Va. — A seminar on local-area networks will be held at the Marriott Crystal Gateway Hotel here March 12-13 by Phillips Publishing, Inc. and Century Planning Associates, Inc.

The seminar will be led by Joseph Nocerino, president of Century Planning. Speakers will include Lee Afflerbach of Columbia Telecommunications, William Herald of Planning Research Corp. and Philip Walcoff of RJO Enterprises, Inc.

The fee for the seminar is $595.

Registration information is available from Phillips Publishing, Suite 1200N, 7315 Wisconsin Ave., Bethesda, Md. 20814.

Calif. lawmakers offer bill to stem hacking

By Jeffry Beeler
CW West Coast Bureau

SACRAMENTO, Calif. — A group of California lawmakers has proposed a legislative remedy to the recent rash of information systems break-ins by teenage hackers and other high-tech vandals.

On Jan. 31, a bipartisan coalition of state assemblymen and senators introduced a bill that would refine California's definition of computer crime to give law enforcement officials increased leeway in prosecuting illicit systems users. If Assembly Bill 2551 passes, state law for the first time would explicitly distinguish between unauthorized systems accesses that are deliberately destructive and other such breaches, in which damage is nonexistent or clearly accidental.

Under the state's existing computer crime law, which took effect about four years ago, an unauthorized systems entry qualifies as illegal only if it results in "malicious" destruction or alteration of hardware, programs or data. The statute classifies all such crimes as felonies and makes no provision for system violations in which malice is absent or unproven.

A.B. 2551, by contrast, divides systems penetrations into two categories and treats each differently. One of the classifications is for felonies, which include any illicit access that ends in knowing or malicious systems tampering.

The other covers misdemeanors, which would apply to users who simply gain unauthorized access to a system, but who plainly intend to do no damage.

If it becomes law, A.B. 2551 would give state authorities "additional flexibility" in charging unwanted systems users with computer crimes, according to Barbara Lloyd, a legislative consultant to Assemblyman Sam Farr (D-Santa Cruz), one of the bill's coauthors. "Today, officials have only a limited range of options. They either have to try to convict violators of a felony, prosecute them on some other kind of offense that has absolutely nothing to do with computers or let them go entirely," Lloyd noted.

But in systems break-ins where the injury is slight or nonexistent, "law enforcement officials may not feel the need to seek a felony conviction because the penalties would be inappropriate to the offense," Lloyd said. "On the other hand, authorities don't want to create the impression that [hackers] can enjoy free rein over other people's systems as long as they don't plan on destroying them. So the state needs a law like A.B. 2551, which would give officials a middle ground between charging violators with a felony and not charging them at all."

The bill would also "send a real clear message" to potential snoopers who think certain kinds of unauthorized systems accesses are exempt from criminal prosecution and penalties, she added.

Although the proposed legislation has received broad, bipartisan support from state lawmakers, representatives of certain special interest groups have expressed concern that the bill might unintentionally discourage legitimate use of electronic bulletin boards. Lloyd professes to understand the misgivings, but voices confidence that A.B. 2551 could be easily amended to address the concerns.

Lotus files copyright suit against Rixon

BOSTON — Lotus Development Corp. filed a $10 million lawsuit in U.S. District Court here last Tuesday charging Rixon, Inc. with illegally copying and disseminating Lotus' 1-2-3 software package. Rixon, the Silver Spring, Md., modem manufacturer, is a subsidiary of Sangamo Weston, Inc.

"The $10 million is an estimate for the number of illegal copies that Rixon made," said Eric Deutsch, associate attorney for the Boston law firm of Testa Hurwitz & Thibeault, which represents Lotus. "A plantiff can charge $50,000 for each infringement of a copyrighted material." That means Lotus is estimating that 200 copies of 1-2-3 were made.

"We know of at least 13 illegally produced copies of the product," Deutsch said.

Rixon was allegedly reproducing user manuals as well as program diskettes and using them in its branch offices throughout the U.S. "Lotus learned of the practice from a Rixon employee," Deutsch said. There is a possibility that the case will be settled before it reaches trial. "There have been discussions between Rixon's counsel and us," Deutsch admitted.

Rixon officials were not available for comment.

Photos courtesy of Cincom Systems, Inc.

While data base gurus have come and gone, Thomas M. Nies, president of Cincom Systems, Inc., has remained one of the industry's most respected spokesmen. In the early 1970s, he predicted the arrival of the "data base decade." That statement has proved prophetic, as measured by sales of Cincom's Total data base management system (DBMS). With more than 6,000 installations, Total is by far the most popular DBMS from an independent vendor. In 1979, Nies proclaimed that "data base, per se, was passe." The statement surprised the software industry, but it, too, has been borne out by the recent rush of data base vendors to expand into other markets. Cincom has been diversifying as well, expanding first into manufacturing applications and more recently into decision support and financial software. However, DBMS has remained the core of its product strategy. Nies was interviewed recently at Cincom's Cincinnati headquarters by Computerworld *Senior Editor/Software Paul Gillin.*

Cincom chief forecasts data base directions

Says programming will be automated

In 1979, you said that data base, per se, was passe. How has that statement been realized, and what does that mean to the data base industry today?

Data base management systems [DBMS] technology has become one of the great delimiters of what can be accomplished. The nature of the data structures, the ability to handle complex transactions, the ability to support end users — all of these things have put additional pressures on DBMS since the '60s and the '70s. Old-style DBMS products that were prominent in the '70s are not satisfactory for the completely unstructured end-user systems of the future.

The second part of that comment is, the framework within which that data base management engine fits must be completely changed. In the '60s and '70s, the idea was that the professional programmer would be knowledgeable of data structures, data storage mechanisms, data management commands and so on. This created a demand for knowledge which became the bottleneck for progress. Those old tools are no longer necessary, so we have to supplement the DBMS with other software which, in effect, automatically does large amounts of the work professional programmers would have done before.

What other trends in data base will drive the market for the rest of this decade?

The first trend is this more comprehensive approach, so that everything is done much more easily and to a much higher quality level. I'm talking five to 10 times productivity improvements in using data.

The second major trend is the movement of the data base capability away from only the province of the mainframe. We should supplement the mainframe with a set of superminis and other ancillary computers to serve specialized needs. But all of those computers need data, and that data should be organized in the data base approach.

A major part of Cincom Systems, Inc.'s product line has been tools that complement the data base, including fourth-generation languages and application development systems. Yet these tools are still being used on rather specialized tasks. What is needed for them to catch on?

The failure to catch on has been a result of the weakness of the products themselves. The problem with these languages is that they're not strong enough to encompass the entire gamut of need of Cobol. Therefore, they have to be used in specialized requirements.

The second limitation is that the processing overhead is so great that the response time and throughput is poor. Therefore, they're limited in applications which have large numbers of transactions or which require good response time.

If we can find a way to build a fourth-generation language which has the full capability of doing anything that a Cobol, PL/I, assembly language or Fortran programmer can do, then it can be used for almost all programming. Then if we eliminate the performance overhead, we eliminate the second great obstacle. I think when these languages are introduced that provide this functional richness and throughput and performance, then they will catch on.

If these tools are so much better than Cobol, it would seem obvious that all mainframe installations would be using them within a few years, wouldn't it?

If IBM offered [Cincom's] Mantis [application development system], I doubt anyone would be doing any on-line programming in Cobol. Our problem is we have to promote this concept without the leverage of having IBM in

See NIES page 18

NIES from page 17

the market.

Many of the vendors are pointing to the user as being the culprit when, in fact, it's not the user's fault at all. It's the vendors' fault, who are delivering the wrong tools at the wrong quality levels, and the users are then being asked to do the impossible.

And the more they struggle, the more they fail, the more the vendors tell them they have to get their act together. It's an unjust situation.

You emphasize data base portability across a wide range of hardware lines. Why is that important to your strategy?

It's important because the nature of the operating systems on the IBM mainframe is toward a batch environment. The roots of that problem lie almost 20 years ago, when IBM had almost exclusively a batch-oriented customer base that it had to migrate across to a 360 environment, and it built a batch job scheduler, which it called the operating system. It had no on-line support. That was added later in the form of a [teleprocessing] monitor. Eighty percent to 90% of the gross horsepower of an IBM mainframe can be consumed in that mundane work which gets you ready to process an on-line transaction, and there's very little of the CPU left to process the transaction itself.

That environment is absolutely intolerable in any kind of a sophisticated on-line environment. The only way it can succeed is to co-mingle IBM mainframes with distributed, interactive-environment computers out there.

To successfully implement distributed processing, one needs to introduce the concept of an interactive operating system, which is so beautifully supported on computers like [those from] Prime [Computer, Inc.], the [Digital Equipment Corp.] VAX and others and which is woefully inadequate on the IBM mainframe. Now they can then have the IBM mainframe concentrating on batch-type operations and some limited on-line inquiry to the corporate strategic files. But out on those plant floors they would have interactive computers with an interactive operating system.

What are your plans for TIS [Cincom's interactive data base and application development product]?

Our goal by Jan. 1, 1990 is to say that it is no longer necessary to write a line of code. You can simply specify requirements in a high-level way, either at the programmer or the end-user function, and all of the software will do all of the program design, development and implementation automatically.

Today we're probably 70% to 75% of the way. It is only necessary for programmers to write 25% of the code in a TIS shop. The rest of the programming is automatically done by the software. We still have procedural logic that needs to be done, but today we've eliminated a lot of that with more powerful languages and so on.

Our goal in the next two to four years is to deliver the software that will eliminate what now needs to be done so that programmers, end users and system designers can specify specifications and everything else required will be eliminated.

In doing this, you have chosen not to make that big a splash about your move into relational, which a lot of your competitors have done. Do you not view that move as being that important?

I think simplifying the way you view the data is a necessary prerequisite step. However, the software business has become faddish, marketing hype, sales gimmicks, and the software industry at large is latching onto the current buzzword.

Two years ago the buzzword was "integrated." Everything was integrated, and in some cases it was laughable the way these products were integrated.

Today the buzzword is "relational." Everybody that knows anything about relational looks at most of what's out there and sees that it's laughable.

Cincom has been a relatively quiet company. Can we expect to see more of a marketing push in the coming years?

We are ready to increase our marketing capability because we've spent the last six years building a product line which we believe is preeminent. We now are in the process of substantially increasing our marketing staff, and, in fact, a number of our products are increasing sales at rates greatly ahead of the software industry in general.

We do have to find a way to get a bigger presence. I think that's a weakness of Cincom.

In the last couple of years we've also seen you move into manufacturing and now into decision support applications. Are we going to see Cincom trying to cover the entire market?

Our role is to cover all of the major systems software and office automation functions, including electronic mail, word processing, keyword and context retrieval systems. We're also talking about everything in the area of system design and development, data base, query languages, multicomputer linkups and so forth. We're also talking about a full gamut of end-user software, all the way from electronic spreadsheets, to graphics systems, to query languages. We have now completed 85% to 90% of all the products we plan to offer in these markets.

You're a $70 million-plus company and still privately held. Software companies one-quarter your size have gone public. Why do you remain private, and do you intend to remain that way?

Our strategy is to have products which are so substantially superior that they will not have any legitimate competition. This represents a massive commitment to research and development, which means large amounts of money over a sustained period of time. If we were a public company, the pressure for profitability increases [would be] so extreme that we fear the pressures in the marketplace would force us to abandon the superiority strategy.

The second reason is because we want to be able to have a reasonable, if not substantial, percentage of the shares of our company owned by the people of the company. . . . This requires a distribution strategy of shares over some time that perhaps an outside, public ownership would not allow. We have to have this distribution before we become a public company.

We have completed much of the development effort that we wanted to do. We've also begun a major distribution of the potential ownership of the company among our people. So we're studying the stage that should Cincom want to become a public company, we can do that. We're not adverse to the public offering idea. It has its attractions.

Banks urged to coordinate micro strategy

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — While personal computers solve many of the integration problems that large organizations face, their presence must be part of a coordinated strategy, attendees at the recent 1984 Insurance and Protection Conference of Financial Institutions were told. The conference was sponsored by the American Bankers Association.

Office automation, including the use of personal computers, is a combination of people, procedures and technology working together to improve productivity, noted Sally Huns, assistant vice-president at Manufacturers Hanover Trust Co. in New York.

"While our short-term goal [at Manufacturers Hanover] is to provide systems to solve specific applications, our long-term goal is to custom design systems for specific business environments — that is, have systems designed to fit the business need instead of the other way around," Huns said.

Professional business people with computing power within arm's reach will find innovative ways to solve their own business problems, Huns added.

Turning to the problem of data security, Huns maintained that the issues relating to personal computers and other end-user technologies are not very different from those associated with larger mainframe data centers.

The difficulties in controlling security with micros, she said, stem largely from the decentralized nature of the technologies involved.

Huns recommended establishing a set of guidelines for the users of personal computers. These guidelines, she suggested, are intended to:

- Prevent misuse and loss of data processing assets.
- Ensure the integrity and auditability of information created within the various departments using microcomputers.
- Minimize duplication of effort.
- Ensure that the organization receives the maximum return on its automation investment.

Becomes data center

"With a personal computer on his desk, the user in effect becomes a data center and must conform to the same requirements as any other computer installation for safe and secure operation.

"The procedures and controls put in place must be commensurate with the value of the data being protected," she contended.

Huns claimed that by educating personal computer users, by giving them hands-on experience and by helping them evaluate their security needs, an organization can make its users active participants in the protection of data and applications.

Also speaking at the conference was Laurance Ochs, a partner in the Washington, D.C., law firm of Compulaw Chartered, who warned of the growing trend toward computer crime.

"Computer fraud, regardless of the term used to describe it — computer crime, computer abuse, computer-related crime — is where the 'big bucks' are today in white-collar crime," Ochs said.

Over the last decade, he said, there has been an unprecedented growth in computer fraud, with one estimate putting the monetary loss at between $3 billion and $5 billion a year.

"The time is fast approaching when one out of every 10 people in the work force will have a direct working relationship with computers. With the number of installed computers proliferating more rapidly as a result of microprocessors, there is no doubt that computer fraud will grow proportionately," Ochs said.

The ability of a would-be perpetrator to penetrate a communications network depends, Ochs said, on several factors, including his technical knowledge of both telecommunications and the system he is attempting to penetrate and his access to or possession of the necessary interception and monitoring equipment.

The lawyer suggested that banks and financial institutions take out insurance indemnity covering employees, independent contractors, software vendors, maintenance personnel and unauthorized individuals.

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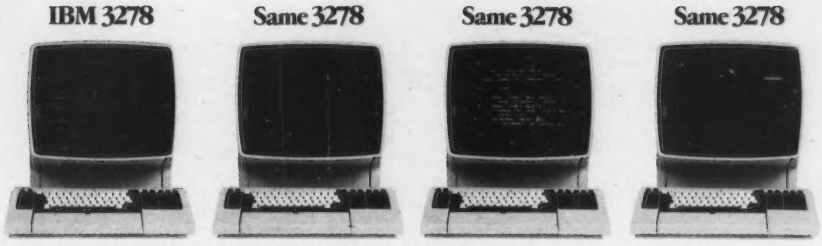
Glossary:

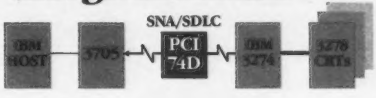
ASCII (American Standard Code for Information Interchange). The language spoken by DEC, not by IBM (without PCI).
ASYNCHRONOUS Start-stop communications technique used by low-cost low speed ASCII terminals and Personal Computers.
CoaxFACE™ Exclusive PCI device provides RS232C interface to coax cables for attachment of ASCII terminals to PCI converters.
DEC Digital Equipment Corpora-

ow speak to DEC,"



tion. Used here as synonym for an ASCII host.
DECONVERTER (74D) Makes the IBM 3270 world ASCII-compatible.
FULL SCREEN The ability to modify an entire CRT screen of data without host interruption.
MODEMS Interface to allow digital devices to communicate over phone lines.
PaperCRT™ ASCII hard copy keyboard terminals have all the versatility of 3278 CRTs with this PCI option.
PCI (Protocol Computers, Inc.) We make the non-IBM world IBM compatible. Now we make the IBM world non-IBM compatible, too.
SDLC (Synchronous Data Link Control). Line protocol for data communications between IBM systems and terminals.
SNA (System Network Architecture). IBM's approach to data communications networking.
SNA/SDLC IBM communications; non-compatible with DEC (ASCII) communications (without PCI).
SYNCHRONOUS High speed, high cost data communications technique.
PCI 74D Deconverter makes the IBM 3270 world ASCII compatible.
3274/76 IBM controllers which support 3278s, 3287s in an SNA/SDLC network.
3278/79 IBM's CRT and color CRT.*
3178 IBM low cost CRT.*
3287 IBM's printer.*
*All non-compatible with DEC (ASCII) without PCI.

Let's get technical.



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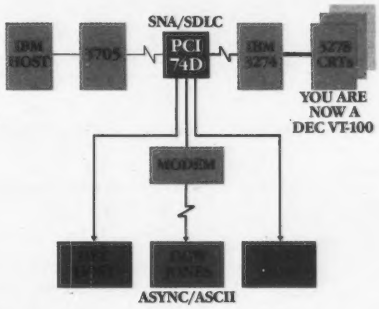

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PCI Making the non-IBM world IBM compatible.

IBM-Apple competition evidenced at Expo

By Patricia Keefe
CW Staff

HOUSTON — "So often it seems as if IBM is this mysterious presence around us at all times," observed Rod Canion, president of Compaq Computer Corp., while speaking last week here at the PC World Exposition.

"This event has to do with [IBM] and [it isn't] even here — or [is it]?" he quipped, looking around.

Vendors, speakers and attendees spent three days talking about IBM, its products, future plans and the compatible marketplace; the other major topic of conversation was Apple Computer, Inc. and its relationship, or lack thereof, with IBM.

CW AT PC WORLD EXPOSITION

Neither IBM nor Apple chose to attend the show, but then they didn't need to. Anyone who wanted to examine the real thing rather than the slew of Personal Computer look-alikes on exhibit needed only to visit Computercraft, Inc.'s booth, where the IBM PCjr and Apple's widely publicized Macintosh were on display.

The Macintosh managed to steal some of the spotlight from IBM. During the Expo, it was typically hidden behind a crowd of curious onlookers, craning on tiptoes to get a closer look at Apple's new baby.

Andrew Fluegelman, editor of both *PC World* (sponsor of the Expo) and *Macworld* and a speaker at the conference, characterized attendees' reactions to the Macintosh as "reserved curiosity" and predicted the new machine will attract visually oriented people, no matter whether they are in the home or business markets. Moreover, he expects the Macintosh to replace the Lisa eventually.

And, despite the use of "standard" and "compatibility" as the two key words of the conference, Fluegelman does not foresee IBM compatibility in the Macintosh's future. In addition to Apple's decision to use non-IBM-compatible 3½-in. disks, "It doesn't need it," he asserted.

Both Fluegelman and micro industry analyst and newsletter publisher Esther Dyson agreed that if anyone can buck IBM, it is Apple. "Everyone I've talked to wants the Macintosh to succeed; 'Go Apple,' they're saying," Dyson said at a seminar called "Survival Strategies for the IBM Personal Computer Marketplace."

She added that Apple is appealing for two reasons: It's the underdog, and it has a lot of spirit. "I hope Apple succeeds," she said, but warned that Apple's spirit alone will not ensure success.

It is harder to sell against IBM than beside it, according to Dyson. She noted Lisa's poor showing in the corporate personal computer marketplace, adding that Apple walked away "with its tail between its legs."

Dyson expects the Macintosh to attract the next market generation — nonusers who do not want to learn Microsoft, Inc.'s MS-DOS and complicated software. The key to the Macintosh is that it combines user-friendly software with powerful hardware, she said.

Conceding that IBM has most of the third-party software vendors, many of whom are not writing for Apple, Dyson said IBM has no great advantage over the Lisa family, which includes the Macintosh.

What could hamper Apple in its bid to snub the standard is internal executive turmoil, Dyson said. "They are a small company without the stability of IBM. Also, if the Macintosh is to be successful, Apple must capture the retail channel as it did with the Apple II."

Micro family, Winnie controller among Expo debuts

By Patricia Keefe
CW Staff

HOUSTON — Although it attracted about 15,000 attendees, the three-day PC World Exposition here early this month did not offer many significant hardware introductions. Many name vendors stayed away from the regional personal computer show, which catered to buyers and sellers of IBM Personal Computer products and featured more than 130 exhibitors (300 booths).

CW AT PC WORLD EXPOSITION

But scattered among the peripheral, accessory and software vendors, as well as software and training services firms, were Digital Equipment Corp.; Sperry Corp.; NEC Information Systems, Inc.; Printronix, Inc.; Compaq Computer Corp.; Televideo Systems, Inc.; Hewlett-Packard Co.; Intel Corp.; Epson America Southwest; Corona Data Systems, Inc.; and Eagle Computer, Inc.

Among the products introduced at PC World Expo, sponsored by *PC World* magazine, was a three-member family of IBM Personal Computer- and Personal Computer XT-compatible microcomputer systems from OSM Computer Corp. The series includes the OSM-PC, with 128K bytes and dual, 360K-byte floppy system; the OSM-XPC with 128K bytes, a 360K-byte floppy and a 10M- or 20M-byte hard disk system; and the OSM-VIPC, which offers — in one enclosure — 128K bytes, a 360K-byte floppy, a 10M- or 20M-byte hard disk and a 20M-byte tape system.

The series features a choice of high-resolution monochrome or color monitor; Microsoft, Inc.'s MS-DOS and utilities; and OSM's PC-Link, which allows up to 16 micros (OSM or IBM) to network together. Prices for the three micros start at $24,095 for the OSM-PC; $42,095 for the OSM-XPC; and $67,095 for the OSM-VIPC. OSM is based at 665 Clyde Ave., Mountain View, Calif. 94043.

Winnie with SMD interface

Also at the show, Interphase Corp. introduced what it calls the first Winchester disk controller for the IBM Personal Computer and look-alikes that can support the storage module drive (SMD) interface commonly used in minicomputers. It is said to bring the capacity needed for large accounting and data base management applications to the personal computer level.

The Maverick SMD PC-80 reportedly offers the benefits of the SMD interface (increased capacity and speed) and accommodates 8-in. or larger disks with fixed and/or removable cartridge without software or hardware modifications.

Other features include support for two SMD drives from 16M to 1,600M bytes of on-line storage; networking that supports Xerox Corp.'s Ethernet and IBM's Personal Computer Net and X-Net; compatibility with popular operating systems; storage capacity from 16M to 800M bytes for each disk; fully buffered architecture; support for dual porting and fully programmable sector sizes up to 960 bytes; and high-speed direct memory access.

The Maverick is priced at $1,895. Interphase is located at 2925 Merrell Road, Dallas, Texas 75229.

See EXPO page 24

Have a corporate micro story?

The dust from the corporate microcomputer boom is finally starting to settle. For many firms, the mad dash to buy and install microcomputers is ending and the development of plans for coordinating and controlling micro use is beginning.

Computerworld will publish its second annual "Micros in Big Business" Special Report in the April 30 issue. This special section will focus on the success and failure of micros in large organizations. Included will be articles covering micro-to-mainframe links, microcomputer networks, compatibility issues and the growing concern about security and data protection.

How are microcomputers working out in your organization? If you have a story you would like to share (either bitter or sweet), *Computerworld* would like to hear from you.

Contributions can take one of two forms: a tutorial article discussing an issue or trend in corporate microcomputing; or a story outlining a user's experience with micros.

Articles must be typewritten (double spaced) and no longer than eight pages. Artwork such as charts, graphs or photographs is encouraged. Authors should also include a brief biography and a phone number where they can be reached.

The deadline for submissions is March 5. Articles should be addressed to Donovan White, Special Reports Editor, *Computerworld*, 375 Cochituate Road, Box 880, Framingham, Mass. 01701.

'Bottom-up' design seen as approach for '80s

By Lynn Haber
CW Staff

WASHINGTON, D.C. — "We have now entered a period, presumably one which is going to last a long time, in which the customer is doing 'bottom-up' design. This means that the customer is going out and buying workstations and assuming that a system exists that will allow him to hook those workstations up and do something meaningful."

Speaking at the recent Communication Networks Conference and Exposition here, Amy D. Wohl, president of Advanced Office Concepts Corp. in Bala Cynwyd, Pa., guided her audience through the changes that made "top-down" system design — buying a system and attaching a workstation — obsolete and bottom-up system design the personal computer networking approach of the 1980s. According to Wohl, this turn in design approach has occurred over the past three years and is based upon assumptions on the part of both the customer and the vendor.

For the customer, the assumption is that a standard environment is available into which the customer can plug devices. "It's similar to the transaction that people make when they go to a department store and buy an electric lamp," Wohl explained. "They take it home, secure in the knowledge that if they use it anywhere in the U.S. they will be able to plug it into any electrical outlet, and it will work. Not only is the customer assuming a standard environment, he's also assuming a standard interface."

For the vendor, Wohl said, bottom-up system design means that it will have to make one of four choices on how to fit into the marketplace:

- It can be the standard (but this position will be open only to the market leader).
- It can provide a compatible environment and sell a product that is almost the same as the standard.
- It can back out of network design, but make its product attachable to the standard.
- It can set a new standard and be outside the existing standard.

More personal computers

Wohl predicted that by the end of 1984, business will have more personal computers installed than ever before, with IBM delivering an estimated two million Personal Computers this year. And based on the number of personal computers in place, and particularly the pervasiveness of IBM in that market, the speaker concluded that "you can set standards in committees, but only the market leader gets to set standards in the marketplace — and IBM is very much that leader."

Other changes that have occurred in the approach to workstation design are related to who in the corporation will be active in the decision-making process and who the workstation user will be, according to Wohl. Between 1981 and 1982, the person who most commonly looked at the terminal, word processor or workstation slated to be used in the front office by a noncomputer person was an office service worker, administrator or DP manager.

By the end of 1983, however, the person responsible "for buying [and] implementing ... the workstations was the data processing manager or someone on that person's staff — the [management information systems] director, information services manager and so on," Wohl said. "And rather than look for specific functions that the workstation offers or specific interfaces with which you access that information, what have become the important workstation features are the ability to fit into an existing communications environment, compatibility with workstation standards in the company and [whether it supplies] access to data and data processing."

EXPO from page 23

Printronix unveiled the latest addition to its MVP Printer Series, a compact dot matrix line printer that is plug-compatible with the IBM Personal Computer and other microcomputers. It can be used either as a shared-resource printer for workstation clusters or as a system printer for microcomputer-based local-area networks.

The MVP 150B reportedly supports applications from graphics to word processing, including Lotus Development Corp.'s Lotus 1-2-3 and Metasoft Corp.'s Benchmark. It prints office correspondence at 80 line/min and drafts reports at speeds up to 200 line/min.

The MVP 150B is priced at $3,745 from Printronix, located at 17500 Cartwright Road, P.O. Box 19559, Irvine, Calif. 92713.

Personal Systems Technology, Inc.'s (PST) Persyst Products went to the PC World Expo to announce a single-board color display adapter for the Personal Computer and Personal Computer XT. The Best-of-Both (BOB) Display Adapter is said to support all the color graphics features offered by IBM's Color Display Adapter software.

The BOB adapter interfaces with advanced high-resolution monitors, its vendor said.

Suggested list prices begin at $425, with shipments scheduled for the end of the first quarter.

PST is located at Suite A, 115801 Rockfield Blvd., Irvine, Calif. 92714.

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- **20** Finance/Insurance/Real Estate
- **30** Medicine/Law/Education
- **40** Wholesale/Retail Trade
- **50** Business Service (except DP)
- **60** Government—State/Federal/Local
- **65** Public Utility/Communication Systems/ Transportation
- **70** Mining/Construction/Petroleum/Refining
- **75** Other User_____

Vendors
- **80** Manufacturer of Computers, Computer-related Systems or Peripherals
- **85** Computer Service Bureau/Software/Planning/ Consulting
- **90** Computer/Peripheral Dealer/Distributor/Retailer
- **95** Other Vendor_____

2. OCCUPATION/FUNCTION (Circle One)
- **11** President/Owner/Partner/General Manager
- **12** VP/Assistant VP
- **13** Treasurer/Controller/Financial Officer
- **21** Director/Manager/Supervisor DP/MIS Services
- **22** Director/Manager of Operations/Planning/ Administrative Services
- **23** Systems Manager/Systems Analyst
- **31** Manager/Supervisor Programming
- **32** Programmer/Methods Analyst
- **35** OA/WP Director/Manager/Supervisor
- **38** Data Comm Network/Systems Mgmt
- **41** Engr/Scientific/R&D/Tech Mgmt
- **51** Mfg Sales Reps/Sales/Marketing Mgmt
- **60** Consulting Mgmt
- **70** Medical/Legal/Accounting Mgmt
- **80** Educator/Journalist/Librarian/Student
- **90** Other_____

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant

- **A.** Mainframes/Superminis
- **B.** Minicomputers/Small Business Computers
- **C.** Microcomputers/Desktops
- **D.** Communications Systems
- **E.** Office Automation Systems

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INTERNATIONAL REPORT

AUSTRALIA

CARLTON — An IBM 4381 mainframe supplied under IBM's third-party marketing scheme [CW, Nov. 18] is an integral part of the Traffic Authority of Victoria's massive project to automate the issuing of some 2.5 million drivers' licenses. The contract, valued at almost $4 million, was recently awarded to Computer Power here.

BRISBANE — ICL Australia Pty. Ltd. has won the lion's share of the $6 million Queensland Police Department contract. The plan calls for ICL to build a statewide network based on a dual configuration of its yet-to-be-released Estriel processor. Also sharing the contract are Era Computer Corp., which will supply an unspecified number of Era 2007 Data Encryptors, and AWA, which will provide 300 of its 8602 Intelligent Workstations.

FRANCE

PARIS — An application development system that is said to boost productivity for IBM VM/CMS and TSO users has been announced here by CAP Gemini Sogeti. Multipro combines a software package with a number of enhanced IBM Personal Computer XT workstations to create a tool for each level of program and system design, the vendor explained.

Multipro, which features a structured graphics facility and a window management function, is priced from $24,000 and will be on display at Sofcon in New Orleans on Feb. 21.

JAPAN

NAGOYA — While Japan's new domestically developed supercomputers are primarily used in universities, Japanese manufacturers are reportedly considering selling them elsewhere. Hitachi Ltd.'s first supercomputer was installed at Tokyo University, and Fujitsu Ltd.'s first supercomputer has recently been installed here at Nagoya University.

TOKYO — Toshiba Corp. has developed what it believes to be the world's first 256K-bit Cmos static random-access memory (RAM), integrating approximately 1.6 million elements on one chip. The Cmos static RAM chip features high-speed operation, low power consumption and ease of use superior to dynamic RAM, the vendor claimed. The chip was developed with micron precision and other advanced technologies, sources said.

SWEDEN

STOCKHOLM — Sweden's Prince Bertil awarded the Swedish Export Prize to Handic Software during a recent ceremony here for its "remarkable increase in export volume." Handic achieved an eightfold growth in exports in just one year, from $600,000 in 1982 to $5 million in 1983. The company attributed its success largely to the popularity of its Calc Result, a spreadsheet program that runs on microcomputers. Handic has sold over 100,000 copies of the program, 90% of which were exported.

STOCKHOLM — IBM's Swedish subsidiary, IBM Svenska AB, placed fifth in profits among IBM companies in Europe, Africa and the Middle East in 1983. IBM Svenska's volume leaped from $458 million in 1982 to $710 million in 1983; profits rose 84% to $136 million. The gains were attributed in part to a healthier Swedish economy and also to a tax break that prompted companies to purchase products before the end of the year, company sources said.

STOCKHOLM — Swedish hardware exports rose 76% last year, an all-time high valued at $470 million. Most of the exports went to West Germany (25%), France (12%), Great Britain (10%) and the U.S. (5%).

MANAGERS ON THE MOVE


Grzanka

CHESTER T. GRZANKA has been named an assistant vice-president of Hoffmann-La Roche, Inc. in Nutley, N.J. He will continue as director of corporate computer services and assume responsibility for all data processing activities.

Grzanka joined the company in 1968 as a programmer analyst. He was formerly a project manager for ITT and IBM. He has also held adjunct teaching positions at Rutgers University.

Grzanka holds a B.B.A. from Pace University.

■

EDWARD E. WENDT has been appointed senior vice-president of California Federal Savings and Loan Association in Los Angeles. Wendt will direct MIS within the operations group at the bank's new service center in Rosemead, Calif.

Wendt joined California Federal in 1976 as department head in charge of data processing activities related to savings services. He was named assistant vice-president in 1978, vice-president in 1979 and head of the MIS division in June 1981.

Previously a DP consultant serving the financial services industry, Wendt holds a bachelor's degree in accounting from California State University in Los Angeles.

■

EDWARD BAUGH has been promoted to the newly created position of vice-president of management information systems and KEVIN MYERS has been named data processing manager for Jay-Zee, Inc. in Maryland Heights, Mo. Jay-Zee is a manufacturer of mens' clothing.

Baugh has been with Jay-Zee for 16 years. Myers, who will manage the programming operations at Jay-Zee, has been at the company 12 years.

■


Delaney

EDWARD T. DELANEY has been named vice-president for Midlantic National Bank's Information Service Department in Edison, N.J. Delaney serves as manager of Midlantic National's systems and programming area where he is responsible for the development and maintenance of all application systems.

Prior to joining Midlantic, Delaney was with the actuarial department at the Aetna Life and Casualty Company in Hartford, Conn., and programming manager of the U.S. Navy's Atlantic Command Operations Control Center in Norfolk, Va.

He is a graduate of Seton Hall University and New York University where he received a B.S. and an M.S. in mathematics, respectively.

■

MICHAEL C. BANGS has been appointed vice-president of information technology for Prentice-Hall, Inc. in Englewood Cliffs, N.J. He will have overall corporate responsibility for the introduction and utilization of information technology throughout the publishing company.

Bangs is a former vice-president, Computer Center Services, with Informatics General Corp. and has held a number of management positions with Insco Systems Corp., a subsidiary of Continental Insurance.

■

Witco Chemical Corp. in Woodcliff Lake, N.J., has appointed WILLIAM BIERNACKI, GORDON OWENS and JOSEPH TITELIUS as assistant directors of its MIS department. Witco manufactures and markets special purpose chemical and petroleum products and engineered materials.

Biernacki, previously supervisor of electronic data processing audits for Witco, assumes responsibilities for centralized systems development at the company. He has been with Witco since 1978 and has been in the DP field for 23 years. He is a graduate of Fairleigh Dickinson University in Rutherford, N.J.

Owens will be in charge of Witco's distributed systems, telecommunications and manual procedures. He comes to his new position after serving as a regional director of MIS for the company at Melrose Park, Ill. He joined the Richardson Co. at that location in 1977 prior to its acquisition by Witco. A graduate of Dartmouth College and Northwestern University, he began his DP career in the early 1960s.

Titelius will be responsible for operations at Witco's various computer centers in the U.S. Previously manager of the company's corporate data center, he has held various positions in data center operations since joining Witco in 1959.

■

MARTIN B. ROSCH has joined Ipco Corp., a provider of health care products and services, as director of management information systems in White Plains, N.Y., where he will plan and coordinate the information needs of Ipco corporate headquarters. He will provide guidance and assistance in the MIS area to all Ipco divisions in addition to his responsibility for management of the corporate data center.

For the past 11 years, he served as director of MIS for Sony Corp. of America.

He received a B.S. in 1963 from Brooklyn College and an M.S. in 1964 from Penn State University.

NEWS

JESS D. RAY has joined Associates Bancorp in Chicago, an affiliate of Associates Corp. of North America, as vice-president of business systems.

Ray is responsible for business systems at Associates Commercial corporate headquarters in Chicago, which includes information processing services for the Chicago organization plus interfacing with Associates Bancorp's central data processing operations in South Bend, Ind.

He most recently was manager for marketing and sales of Raytheon Computer Services in Chicago. He has also been vice-president of the Midwest region for Information Industries, Inc.; director of marketing for Computer Sciences Corp. in Los Angeles; and regional manager for Docutel Corp. in Chicago.

Ray attended the University of Dayton and has a bachelor's degree in marketing from Elmhurst College, followed by graduate-level courses in marketing strategy at the University of Chicago and Northwestern University.

■

Dunlevy

PAUL B. DUNLEVY has been promoted to corporate manager of systems for Cyclops Corp. in Pittsburgh. He will coordinate the systems and communications activities of Cyclops' various steel, specialty retailing and nonresidential construction divisions nationally and internationally.

Dunlevy, who joined Cyclops in 1961, was most recently director of systems and data processing for the Universal-Cyclops specialty steel division.

Dunlevy is a University of Pittsburgh graduate with a bachelor of science degree.

■

GERARD MAGLIOCCA has been promoted to manager of systems planning and administration for Squibb Corp. of Princeton, N.J. His responsibilities include worldwide MIS planning.

Magliocca has served as a programming analyst and designed the development of real-time automation laboratories for Squibb. Additionally, he has served as project manager of financial systems and internal consultant for Squibb's international operations.

He has a B.S. in mathematics and an MBA in finance from Wagner College.

■

DINEASH MANGALICK has been appointed manager of Varian Associates' Information Systems Services in Palo Alto, Calif. Mangalick will supervise business applications in the Systems Development and Information Center.

He has been with Varian since 1974 and was previously manager of marketing/accounting systems development.

A 15-year veteran of the data processing field, Mangalick has held positions at Control Data Corp. and Essex Wire & Cable.

He received an M.S. degree in industrial engineering from the University of Minnesota in 1967.

■

Plourde

DR. PAUL J. PLOURDE has been appointed the first vice-president for information services at Bentley College located in Waltham, Mass. Plourde, whose background includes teaching and research in data base management systems and analytical models in higher education, has served as interim director of the college's computer center.

He joined Bentley in 1979 as associate professor of computer information systems and coordinator of the master's program in computer information systems.

Before joining Bentley, Plourde served as professor and chairman of the Computer and Information Sciences Department at the State University of New York at Potsdam; director of the Three College Computer Center in Amherst, Mass., serving Amherst, Hampshire and Mount Holyoke Colleges; and a director of the New York Higher Education Assistance Corp.

He was president (1976-1978) and board member of the Concom Users Group and president and board member of Byytebaack, Inc., a software firm owned by 24 institutions of higher education. He is currently president of Cause, the association for the development, use and management of information systems in higher education.

Plourde holds a bachelor of arts from the University of New Hampshire, an M.A. from Northeastern University and a doctorate in education from the University of Massachusetts.

■

LARRY E. TRAVIS, a professor of computer science at the University of Wisconsin-Madison, has accepted an appointment to head the university's academic computing center.

Travis joined the UW-Madison faculty in 1964. He served from 1970-72 as director of UW-Madison's Office of Computing Affairs. From 1979-81, he was chairman of the computer sciences department.

In 1981-82, Travis was at the University of Delaware, where he was professor of computer science and electrical engineering and associate provost for computing.

He received his bachelor's degree from the University of Colorado in 1951 and his doctorate in the philosophy of science from the University of California, Los Angeles in 1966.

NASCP annual conference slated for San Francisco

SAN FRANCISCO — Some 400 strategic planning executives are expected to attend the annual conference hosted by the North American Society for Corporate Planning (NASCP), scheduled at the Sheraton Palace here April 29 to May 2.

"From Steel to Silicon: Planning in a Restructured Economy" is the theme of this year's meeting, which will focus on five key issues addressing the transition to new technology: "How to Manage the Development and Introduction of New Technology"; "The Politics of Change"; "Succeeding in the Global Marketplace"; "Leadership, Entrepreneurship and Culture"; and "CEO Views."

Speakers will include Nolan K. Bushnell, founder of Atari, Inc. and now chairman of Catalyst Technologies; Kenich Ohmae, author of *The Mind of the Strategist*; public opinion researcher Mervin Field; and Nucor Corp. President F. Kenneth Iverson.

The conference fee is $625 for members and $700 for nonmembers; additional information is available from NASCP, 300 Arcade Sq., P.O. Box 1288, Dayton, Ohio 45402.

Strategic Data Planning sets March 26 conference

BETHESDA, Md. — The sponsors of the Strategic Data Planning Conference that will be held March 26-28 at the Marriott Hotel here have announced that Dr. Robert H. Holland will deliver the keynote address.

President and chairman of Holland Systems Corp. of Ann Arbor, Mich., Holland will speak on "Strategic Information Planning — the Foundation for Integrated Success." His address will deal with the need for developing an integrated information resource through strategic planning, which encompasses business direction, data and information, hardware, software and communications.

Other speakers scheduled include Henry O. Wintermute of 3M Co., Art Viles of IBM, John Janis of GTE Data Services, Inc., Arvind Shah of Performance Development Corp. and William Baker and James Odell of Database Design, Inc.

The three-day Strategic Data Planning Conference costs $895. More information is available from its sponsor, Barnett Data Systems, at 19 Orchard Way N., Rockville, Md. 20854.

Forum to focus on DSS issues

NEW YORK — A two-day conference dealing with managerial issues in the evaluation and selection of decision support software (DSS) will be held May 21-22 at the New York Hilton at Rockefeller Center.

The conference is titled "Evaluating Decision Support Software: Personal Computer, Mainframe and Distributed Applications — a Managerial Perspective." It is being sponsored jointly by C. Lawrence Meador, executive vice-president of Research & Planning, Inc., the New York chapter of the Planning Executive Institute and the Information Technologies Institute.

The conference will focus on key issues involved in the implementation of DSS with personal computers, mainframes and distributed systems, including managerial user needs assessment, problem diagnosis and networking.

Among the speakers will be Peter G.W. Keen, chairman of the board of Micro Mainframe, Inc.; Michael S. Scott Morton, management professor at MIT's Sloan School of Management; David Ness, associate professor of decision science at the University of Pennsylvania's Wharton School of Business; and Research & Planning's Meador.

Registration for the conference costs $495. More information is available from DSS Conference, 215 First St., Cambridge, Mass. 02142.

Strategem users to meet in March

BOSTON — Integrated Planning, Inc., the developer of the Stratagem decision support system, will hold the first meeting of the Stratagem Users Network (SUN) here March 22-23 at the Westin Hotel.

The keynote address will be given by Terry Gallagher, unit director of Mars Group Services, the information processing arm of the Mars Co.'s European operations.

There is no charge for Stratagem users to attend the meeting. Integrated Planning is located at 338 Newbury St., Boston, Mass. 02115.

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NEWS

Chips & Changes exhibit to begin national museum tour

SAN FRANCISCO — The Chips & Changes exhibit will begin a two-year national tour at the San Francisco Exploratorium, where it will run March 14 through May 10.

Billed as the first major computer technology exhibit that also examines social change, Chips & Changes will combine hands-on and computerized interactive exhibits, live demonstrations and audiovisual presentations exploring computer chip technology and its cultural ramifications.

Organized by the Association of Science and Technology Centers, Chips & Changes will travel to nine major American museums.

In addition to the San Francisco Exploratorium, the Chips & Changes exhibit will visit the Oregon Museum of Science and Industry in Portland June 9 through Aug. 5; The Science Place in Dallas Aug. 25 through Oct. 21; the Science Museum of Minnesota in St. Paul Nov. 10 through Jan. 6, 1985; the Museum of Science and Industry in Chicago Jan. 26 through March 24, 1985; the Science Museum of Virginia in Richmond April 13 through June 9, 1985; the Museum of Science in Boston June 29 through Aug. 25, 1985; the Franklin Institute Science Museum in Philadelphia Sept. 14 through Nov. 10, 1985; and the North Carolina Museum of Life and Science in Durham Nov. 30 through Jan. 26, 1986.

The exhibition is funded by the National Endowment for the Humanities and Intel Corp., with additional funding from Digital Equipment Corp. and the Warner Communications Foundation.

NEWS

Robots to be sold to jails for use as guard devices

By Peter Bartolik
CW Staff

WOBURN, Mass. — Robots are ready to move off the factory floor . . . into jails.

At least that is the plan of a two-year-old company here that recently contracted to supply about 200 mobile robots a year for five years beginning in 1985. Denning Mobile Robotics, Inc. announced recently it will provide mobile robots to Southern Steel Co. of San Antonio, Texas, which, in turn, will sell the devices to prisons to be used as guard devices. The robots will not replace guards, but will be used in tasks that are boring and dangerous, such as patrolling hallways at night.

The robots will not replace guards, but will be used in tasks that are boring and dangerous, such as patrolling hallways at night.

The company has not yet produced a fully functioning prototype. "We have a mobile robot, but it doesn't detect [a human presence]," said Benjamin Wellington, vice-president at Denning, who added that a prototype should be completed in early spring or late summer.

The young company was not established with the goal of churning out prison guard robots. The idea, according to Wellington, was to develop security guard robots for general business use. That is still the main target; developing a jailhouse application "is only marginally different," he said.

The robot currently under development will stand four-feet tall, weigh about 200 lb and come equipped with infrared and ultrasonic sensors along with ammonia "sniffers" to detect odors given off by human bodies.

The robot will be programmed to speak as many as 10 different sentences, including warning escaping prisoners, "You have been detected."

Encased in an armored body will be two Motorola, Inc. 68000 microprocessors, "vast amounts" of random-access memory and some erasable programmable read-only memory (Eprom), Wellington said. Eprom memory will store information that must be nonvolatile, such as a map of the prison structure.

Powering the robots will be lead-acid batteries carrying over 2,000A. One of the fundamental problems in designing the product is placing enough on-board power in the units. As designed, the machines will operate for 12 hours and recharge for three hours.

The robots will communicate constantly with a base station via microwave. There are no plans to have the robots communicate with a central computer, Wellington said.

Denning currently employs 14 people and will expand to between 20 and 25 people during development and production of the first six field test units. The company president and founder, R. Warren George, formerly headed his own Washington, D.C.-based management consulting firm, Denning Associates.

According to Wellington, the company has industrial liaisons with robotics centers at MIT and Carnegie-Mellon University and "some superior people working on the artificial intelligence aspects."

NYPD bomb squad using robots in life-threatening situations

NEW YORK — It's become a cliche that the ideal tasks for robots are those that are either too tedious or too dangerous for humans. The New York Police Department (NYPD) now utilizes three strictly mechanical, remote-controlled robots in potentially life-threatening situations.

In early January, one of NYPD's robots was loaned to the Elmira, N.Y., police department during a shoot-out that left one policeman dead and two others injured. Two gunmen were cornered in an apartment, and police eventually used the robot device "to go in and ascertain the suspects were dead," a spokesman for the Elmira police department said. He declined to discuss NYPD's devices.

Nor would NYPD discuss the use of the device in Elmira, but it was willing to talk about the general functions of its robots. NYPD obtained its first robot last February and has since acquired two others, one for its bomb squad and one for its emergency squad. The robots were purchased from a Canadian firm, Pesco, which has been producing them for six years.

Detective Frank Guerra, training officer for the bomb squad, said his department uses a robot two to three times a week. Bomb squad technicians operate the robots via a remote panel linked to the device.

The robots weigh 230 lb., measure 40-in. long by 26-in. wide and move on six independent wheels. The robot's carriage is levered so the device can climb over curbs. Power is provided by two 12V wet-cell batteries.

The robot units each contain an X-ray monitor, a spotlight and a camera that can span 360 degrees and send a picture back to the control panel. A mechanical hand can open and close with a "soft touch, to pick up something like an egg or glass of water, and a hard touch, to pick up items like briefcases," Guerra said.

He compared the squad's use of the robot to a golfer's use of a particular club. "In golf, you have several clubs; the bomb squad technician has X-ray devices, dogs and the robot. Whatever the technician feels he needs to do the job, he selects," Guerra said.

OFF THE PRESS

GEORGE HARRAR

BOOK REVIEWS

THE UNIX OPERATING SYSTEM BOOK

By Mike Banahan and Andy Rutter

If you have access to a terminal on a system running Unix, then pull up a chair, open this book and delve into the intricacies of this operating system. There's no standards discussion here, no comparisons to Pick & Associates, Inc.'s Pick or Digital Research, Inc.'s CP/M operating systems and little speculation about Unix's place in the 16- or 32-bit worlds.

The book is a hand-holding walk through the shell and down to the kernel of Unix. In Chapter Eight, the hand is let go. Topics fit for a beginner (files and simple commands, the editor, C language, filestore) give way to more complicated matters (the process environment, libraries, maintenance).

Paperback, 218 pages, $16.95, ISBN 0471-89676-4. John Wiley & Sons, Inc., 605 Third Ave., New York, N.Y 10158.

DESIGNING AND IMPLEMENTING LOCAL-AREA NETWORKS

By Dimitris N. Chorafas

The book begins by answering a question few people are asking anymore: "Why should we want to link micros?" But the answer does illustrate the pressure widespread personal computer use is exerting on the creation of local networks. The real question for data processors, as Chorafas says later on, is not whether they should develop a network for their users, but which one they should develop.

Broadband is emphasized in the technical section as the feature most important in a system where a single carrier must combine different services.

"In the 1980s," the author says, "the bandwidth need will exceed other system requirements. The more we have, the more we want. Bandwidth will be a dominant factor in implementing office automation systems."

In the product section, commercial offerings are analyzed to show the various ways the technical features of the first section are utilized. Under scrutiny are Corvus Systems, Inc.'s Omninet, Nestar Systems, Inc.'s Cluster One, Xerox Corp.'s Ethernet and Datapoint Corp.'s Attached Resource Computer, the earliest local network extant.

Hardcover, 354 pages, $32.95, ISBN 0-07-010819-6. McGraw-Hill Book Co., 1221 Ave. of the Americas, New York, N.Y. 10020.

DIGITAL IMAGE PROCESSING

By Gregory A. Baxes

How do you get a clear photograph of the moon? Image processing — the alteration and analysis of pictorial information — was developed by the National Aeronautics and Space Administration to answer that question on the Apollo missions. Today, image processing sees use in medical, factory automation and robotics control applications, among others.

Understanding image processing requires understanding the human eye, which is the starting point for this book. Spatial and brightness resolution, histograms, pixel points and data compression are basic processing concepts covered.

After the concepts comes the hardware that makes the concepts work. Commercial equipment supports the five primary functions of data handling: image digitization, image storage, image display, external host-computer interface and internal image processor interface. The author's rule of thumb: The more a system costs, the faster and more flexible it will be processing image data.

Paperback, 184 pages, $14.95, ISBN 0-13-214056-X. Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632.

BOOKS OF NOTE

RELATIONAL INFORMATION SYSTEMS, by T.H. Merrett: *hardcover, 507 pages, $22.95, ISBN 0-8359-6642-9. Reston Publishing Co., Reston, Va. 22090.*

THE UNIX PROGRAMMING ENVIRONMENT, by Brian W. Kernighan and Rob Pike: *hardcover, 357 pages, $26.95, ISBN 0-13-937699-2. Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632.*

THE KISS PRINCIPLE: APPROACHES TO BUILDING RELIABLE SYSTEMS, by Ronald B. Smith: *hardcover, 207 pages, $19.95, ISBN 089433-198-1. Petrocelli Books, Inc., 1101 State Road, Princeton, N.J. 08540.*

THE SOFTWARE GUIDE: IBM PERSONAL COMPUTER & XT, by Gerald VanDiver: *paperback, 1,035 pages, $24.95, ISBN 0-912603-00-3. Micro-Information Publishing, 15420 Eagle Creek Ave., Prior Lake, Minn. 55372.*

VIRTUAL STORAGE ACCESS METHOD, by Ronald K. Ferguson: *paper (for three-ring binder), 425 pages, $32.50. Software Information Services, P.O. Box 4132, Bellevue, Wash. 98009.*

Publishers wishing to have their books considered for review can direct books, prepublication galleys, press releases, catalogs or other information to George Harrar, Book Review Editor, Computerworld, *P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.*

Casa/SME names Hall president

DEARBORN, Mich. — John C. Hall, vice-president of North & Donahoe of Santa Ana, Calif., has been elected president of the Computer and Automated Systems Association of the Society of Manufacturing Engineers (Casa/SME).

He succeeds Gordon A. McAlpine, who is associated with Time Engineering in Troy, Mich.

The membership of Casa/SME includes more than 7,000 engineers and executives. The organization has 33 chapters worldwide.

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NEWS

University users developing own applications

ALBANY, N.Y. — At many large computer installations — even those with 24-hour, seven-day operations — there often is not enough time to develop application programs for individual users or small groups.

But such applications are often vital to middle-line managers and the performance of their departments. Lacking them, these departments have been scurrying to microcomputers to satisfy their processing needs.

The State University of New York here had just that problem. The university had plenty of room on its Sperry Corp. 1100 series mainframe processors. The 10-person DP staff had a "hard time getting mandated things done," noted Pat Panzl, assistant director for Administrative Systems Development, and definitely not enough DP personnel to develop applications for everyone.

The solution, Panzl said, was teaching users to develop their own applications using Sperry's Mapper application development package linked to an 1100/83 mainframe. There are currently 25 to 30 Mapper terminals on campus and 15 Mapper applications in place. While a total of 400 computer terminals are in operation on the campus, most were installed before Mapper came on the scene in 1981. Those terminals cannot be adapted to use the Mapper program, Panzl said.

Of the 15 Mapper applications, only one would have been given any priority by the systems development staff. That program, which links financial aid to draft registration, is a government-mandated application.

The university is using Mapper as an alternative to microcomputers. "Almost any office would be better served with Mapper when accessing institutional data than with any personal computer," said Barbara Wolfe, associate vice-president for Computing Services.

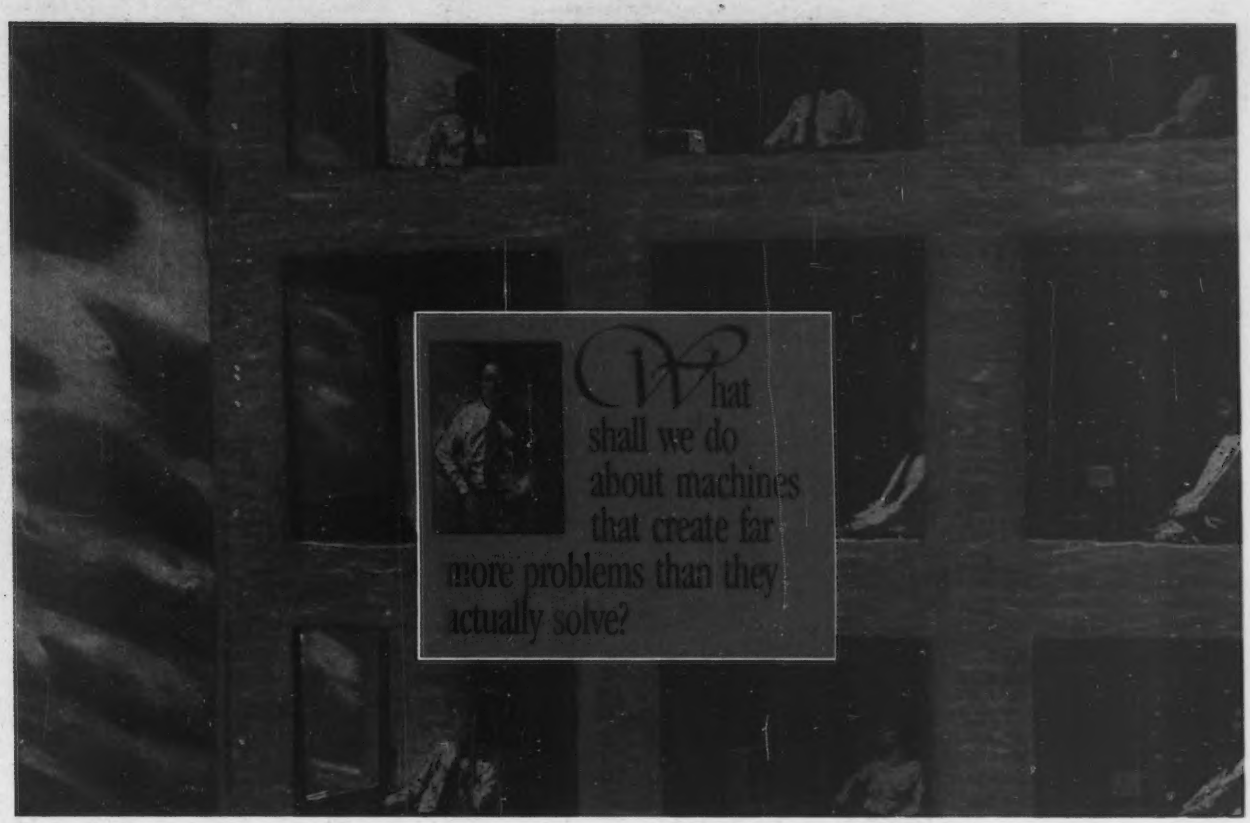
As evidence, she cites an application for scheduling students to counselors. With a microcomputer, the administrator would have to key in information gathered during student registration. The Mapper package, on the other hand, enables the user to access the main computer data base where the student information is stored. The administrator can then manipulate the data to obtain the desired results without duplicate data entry or synchronization problems.

"The user can play with data," noted Stephen Murphy, data base manager and coordinator. Mapper was "designed as a one-way funnel from the data base, allowing the user to extract from the master file only and input to his or her own system." Murphy said that, unless otherwise authorized, a Mapper user cannot enter or delete information from the data base.

To encourage direct computer use by administrators, an orientation program to introduce computer usage was conducted. A demonstration of Mapper was included. This orientation occurred during the summer of 1982.

"Our objective was to build confidence to deal with the computer," recalled Carole Warren, manager of Application Support, whose job is to train users and, with Murphy, help them get their applications up and running. "They teach themselves," Warren said of users.

One such user is Henry Mau. Mau is the associate for University Financial Analysis and is in charge of monitoring a budget of some $70 million, of which 75% is allocated for salaries. "I had a general idea of how much each department spends on salaries, but I wanted to make it more responsive to individual transactions," Mau said.



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A new era of problems was delivered instead. As MIS manager, you have observed: too many different brands of computers. Too many types of software. Software that's difficult to learn, limited and inconsistent in quality, and poorly backed up by manufacturers.

More troubling: there has been no way to control the information flow. No way to make these machines communicate with one another, or with the company's mainframe. No way to customize software to meet specific company needs.

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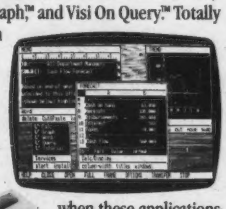

Even more impressive, their strength is actually boosted when these applications are *combined.*

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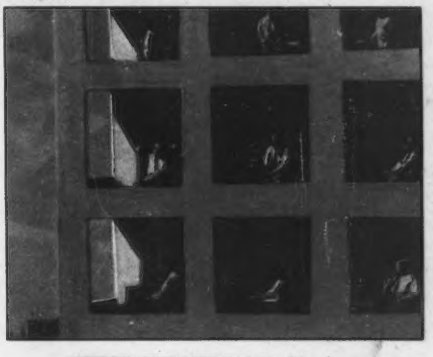

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The Visi On system also provides the basis for a complete package of communications programs. With applications software soon available, Visi On will allow personal computers to emulate both asynchronous and synchronous terminals.

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Data base helps glassmaker peer into future

TOLEDO, Ohio — An online data base of economic and marketing information not only helped a major glassmaker avoid costly system development, it also currently highlights new sales opportunities nationwide.

From its headquarters here, LOF Glass, one of three divisions of the Libbey-Owen-Ford Co., directs five regional marketing operations. One of the keys to success for those marketing teams, according to Nate Condit, director of marketing research and planning, is to identify prime markets for LOF Glass products.

In the late 1970s, Condit said, glass manufacturing companies began to experience higher costs in moving glass from the factory to the market. In addition, escalating interest rates were having a depressing effect on the construction industry, which is a major market for the consumption of glass products.

Today the challenge for glass manufacturers, according to Condit, is to identify and precisely isolate new markets — to avoid the "scatter-gun" approach to marketing.

Condit and his staff first considered developing an extensive data base of national economic and demographic information, as well as models that could forecast patterns of growth and economic concentration. But it soon became clear that the project's costs were prohibitive.

"To develop in-house what we needed would have been quite complicated," he explained. "The staff it takes to establish and maintain such a project represents a heavy budget item. According to our estimates, new wage and benefit costs alone could easily have approached six figures a year.

"We also had to consider the difficulty of building an adequate data base, constructing accurate models and having time to test them. We also would have had to make provisions for keeping the data base up to date."

As a result, the marketing team began to look for an outside service that could provide the data and forecasting capabilities LOF Glass needed. What the team found, Condit said, was that most firms offered expensive, overly detailed models that provided more information than the firm needed.

After an extensive search, Condit finally discovered a service that offered the data and modeling techniques he really wanted: Control Data Corp. Business Information Services' X/Region Service.

The X/Region Service, according to Condit, is an online data base that provides economic and demographic data by geographic areas. The service contains data for all 50 states and the District of Columbia, 266 Standard Metropolitan Statistical Areas and 183 Bureaus of Economic Analysis. The data base contains historical data going back to 1970 across eight statistical categories, and the forecasted data extends through 1990.

Utilizing the X/Region Service, LOF Glass is able to track commercial and residential construction in pinpointed areas. The service aids in uncovering pockets of economic concentration in those regions where population shifts could be tipping off a new boom in construction. Accessing the service through a terminal in the marketing department, researchers can spot specific trends that may not be obvious, but which can have a major impact on regional and national sales.

"We needed accurate projections on what the future markets are going to be in given areas," Condit said. "Armed with this information, the company uses analyses and projections to develop new strategic marketing campaigns."

Publisher trims costs with move on-line

INDIANAPOLIS — Converting from an IBM-based batch processing system to an on-line system that could utilize specialized software for the publishing industry has reduced personnel and costs for a DP center here that manages various activities for four of the seven companies that comprise a major publishing conglomerate.

Until the new system was installed early in 1983, the central data processing center for ITT Publishing was overwhelmed by a mound of batch processing tasks requiring a library of 200 in-house programs with no standardization.

ITT Publishing's seven companies, located in six major cities, publish material that ranges from computer books to *The Joy of Cooking*. The centralized DP center here manages order processing, inventory, sales and accounting activities for four of the companies: Bobbs-Merrill Co. of Indianapolis and New York; R&R/Newkirk, Indianapolis; Marquis Who's Who, Inc., Chicago; and Howard W. Sams & Co., Inc., Indianapolis.

The DP center here previously employed an IBM 4341 with 49 IBM 3270 terminals. Forty-nine data processing personnel performed tedious daily inputting and batch processing of more than 3,000 pieces of written data from more than 150 users. "Because software applicable to the publishing industry was not available for the IBM equipment, our programmers wrote more than 200 programs for the various operations," DP manager Barbara Shrall recently recalled. "This made standardization impossible and broad modifications difficult."

The IBM system could have been expanded if the company had bought enough 3270 terminals to put all users on-line. But the projected costs for expanding and maintaining the existing system exceeded the industry average, and software availability would still be a problem.

Through a Phoenix software house, Computing Information Systems, Inc. (CIS), ITT Publishing purchased Ultimate Corp.'s packaged Honeywell, Inc. hardware and CIS software.

ITT Publishing has saved $1 million, half of its annual data processing operating costs, during the first year of operation, according to Carl Haynes, vice-president and group comptroller. He said half the savings came in personnel costs and the rest came from annual hardware, software and maintenance fees that totaled $750,000. Purchase of the Ultimate/CIS system, including depreciation benefits, costs about $225,000 to $250,000 a year, he added.

The central DP department was reorganized so that nine people now concentrate on program enhancements and on supervising the system's operation rather than on tedious data entry tasks. Most of the personnel who were employed with the old system were data entry workers, according to Shrall.

With the new system, approximately 115 users are on-line and can input and access data from any department in any of the four companies in the system. The companies outside of Indianapolis communicate with the central data processing center through 1200 bit/sec dedicated and dial-up leased lines.

The Ultimate/CIS system, in operation since January 1983, is built around two Honeywell DPS Level 6 processors and the Ultimate version of Pick and Associates, Inc.'s Pick operating system. Each processor has 1M byte of memory, and each runs three 288M-byte disk drives. Peripherals include 115 Ap-

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ITT from page 37

plied Digital Data Systems, Inc. Viewpoint terminals and line-quality and matrix printers from Printronix, Inc., Data Products Corp. and Texas Instruments, Inc.

The customized CIS software includes applications for order processing; accounts receivable; inventory management; general ledger; royalties management; sales analysis; prospective customer list management; and subscription management.

"While our old system did provide centralized information, batch processing and data entry were slow and often delayed updating information," Shrall said. One of the major complaints Haynes received from managers concerned the department's very slow response in making program changes.

In June 1982, ITT Publishing signed a $750,000 contract with CIS for two Ultimate computers and customized CIS publishing software.

"We conducted the search on the assumption that reliable, high-quality software would dictate the use of equally reliable hardware," Haynes said.

The system's features include a relational data base manager and a dictionary-driven data retrieval language, Recall, that allows for easy data access. The operating system organizes files relationally so that data can be retrieved quickly and easily through random-access methods and includes other features such as a report writer, Shrall said.

"The major modification involved creating a menu screen that would accommodate the subsidiary companies' various ways of conducting order processing, inventory, sales managing and accounting," Shrall said. Distinct ways of operating similar departments in different companies are inevitable, and the system allows each company a choice by menu. "However, applications are standardized, and if broad modifications are necessary, it is a simple procedure," she said.

Little time was wasted on the conversion process. "Although the book says the two systems must be run in parallel testing and processing for some time, we had enough confidence in the Ultimate/CIS system through our own preliminary testing that we decided to bring up the new system as we turned off the IBM. We were successful, and there have not been any major problems with the system to date," Haynes said.

"The agreement provided the company's programmers with CIS source code so that we could further build on the software as our needs grew," Shrall said. Major enhancements to the CIS software since installation include the development of software for sales analysis; subscription and prospective customer management; accounts payable; cost accounting; and the building of a data base for information on semiconductor parts.

In addition, ITT Publishing purchased Ultimate's new 5X High Performance Processor enhancement to handle instruction execution, reduce the work load of the Honeywell central processors and increase the internal processing speed by a factor of five. Soon ITT users also will receive the Ultimate cache memory board that contains 4K bytes of high-speed memory and reportedly will increase system performance sevenfold.

Usus to hold conference April 13-15

SAN DIEGO — The UCSD Pascal System User's Society (Usus) semiannual national meeting will be held April 13-15 at the Hyatt Hotel at the Oakland International Airport.

Keynote speaker Susan Nycum, a lawyer specializing in high-technology issues, will discuss the legal issues of software protection. The meeting will also feature two tutorials (free to the public): "The p-System — How to Use it Better" and "Introduction to UCSD Pascal."

Registration prior to March 30 costs $25; registration at the door costs $35. Further information is available from Usus, P.O. Box 1148, La Jolla, Calif. 92038.

Utility's DBMS builds modeling data base

ATLANTA — A major public utility here is using a relational data base management system (DBMS) to build a modeling data base that is shared by engineers, systems analysts and planners throughout the company.

Southern Company Services, Inc. is responsible for all major power plant modeling activities at four subsidiary companies: Alabama Power Co., Georgia Power Co., Gulf Power Co. and Mississippi Power Co.

James Dow, manager of information resources strategic planning for Southern Company Services, directed the development of a neutral — application-independent — structural modeling data base on the basis of criteria outlined by an in-house project team. "The initial concept was to identify and implement a relational DBMS which would allow us to approach plant modeling on a corporate basis," Dow explained.

"We wanted to create a data base environment allowing engineers and others to extract subsets from the data base and manipulate those files in a personal data management environment."

Dow's DP organization operates five Amdahl Corp. 470V/7 and 470V/8 mainframes interfaced to a series of IBM Model 4341s running under VM/CMS. In addition, three Honeywell, Inc. DPS 7 processors under Gcos and two Honeywell DPS/8 processors under Multics are linked to the IBM systems through a Honeywell-developed Multics-to-IBM link.

The firm also utilizes Calma Co.'s Dimension III and Applicon, Inc.'s Model 875 computer-aided design (CAD) workstations.

Relational DBMS chosen

After careful review, Southern Company Services chose Boeing Computer Services Co.'s BCS RIM relational DBMS to maintain its structural modeling data base, which is used for finite element modeling such as the design of steel plates and beams. The BCS RIM system, which resides on the IBM processors, works in conjunction with Calma's graphics DBMS, McDonnell-Douglas Automation Co.'s Structural Design Language (Strudl) system and Sperry Corp.'s Graphics Oriented Finite Element Modeling System (Gifts) software.

According to Dow, BCS RIM gives engineers the ability to maintain multiple copies of a model subset in a personal data base, on either a microcomputer or a terminal in a Honeywell time-sharing or IBM VM/CMS environment. The model subset copies can support multiple and perhaps conflicting design options under consideration. Once the design alternatives are analyzed, the best design is selected and posted back to the shared plant modeling data base.

"The process involves data capture and maintenance using our Calma automated drafting system," Dow explained. "We accomplish the data capture operation with Calma, and pass the model to Strudl for analysis on our mainframe computers. We bring the output from Strudl and pass it directly to the RIM neutral structural model for storage and post-processing."

Dow said the project goal was to establish a link between Strudl, which operates on the Amdahl processors, and the firm's various applications systems, including the Calma and Applicon CAD systems and Gifts.

In a typical application, he explained, an engineer might generate design geometry using the Multics-based Gifts software, use it to create a RIM data base, transfer the RIM data base to the Amdahl system, run an application to generate a Strudl input deck and perform analysis.

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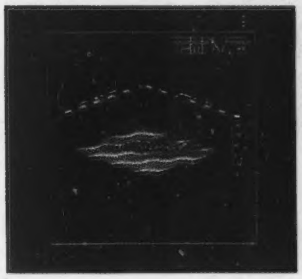

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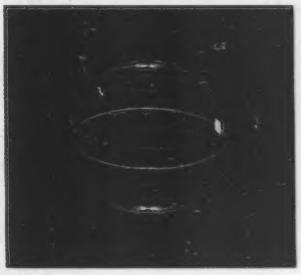

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Generator cuts firm's coding time in half

FRESNO, Calif. — Success often creates as many problems as failure. As Paragon Industries, Inc. — a building wholesale and retail firm headquartered here — grew, its automated accounting application became outdated.

The company faced a common dilemma. Designing an accounting package from scratch was expensive, but off-the-shelf packages did not have the features that the company needed.

A program generator solved the dilemma. Paragon could develop its own accounting application but not have to take the time to write all the code from scratch.

Before deciding to buy a program generator, the company looked at a number of packages. "Each package contained bits and pieces of what we needed, but no package met all our needs," according to Sandra Gaines, DP manager.

The reason, she explained, is that most retail outlets measure stock in item quantities; Paragon accounts for its tile by the square foot (or square meter in the case of imports), its grout by the pound and its pipe by the linear foot. Moreover, the accounting system had to calculate three pricing structures — retail, contractor and dealer — as well as discounts for quantity purchases.

In 1982, the company replaced its Alpha Micro, Inc. microcomputer with a microcomputer system from Wicat Systems, Inc., which can support 16 users and has a 474M-byte hard disk. The Alpha microcomputer was unable to handle the growth of Paragon, which had added five stores: four in California and one in Nevada. "Just tracking inventory in six stores would have exhausted our 100M-byte disk capacity," Gaines said.

The company's accounting application was outdated as well. It consisted of several independent modules that required duplicate entries.

Cobol program generator

Paragon's hardware limited its selection of program generators. "We looked at a number of packages, but none ran under Wicat's proprietary MCS operating system," Gaines said. "Bytel Corp. was the only company willing to port its Cobol program generator, Cogen, to that operating system. The vendor worked out the programming specifications and informed us when the migration was finished."

Using Cogen, Paragon coded order entry, accounts receivable and inventory programs in two months. "Without Cogen, coding would have taken at least four months," Gaines claimed. "The program generator did tedious work, such as counting spaces for screen layouts, that no programmer wants to do. Consequently, writing specifications becomes time-consuming, but coding is relatively fast."

Gaines used the generator to produce screen, report and file frameworks, which Paragon customized. "We were using the program generator the morning it arrived," Gaines said. "Applications are menu-driven and easy to use; it takes only 15 minutes to generate a screen module."

Installation problems were minor. "Cogen screens were smaller than our screens," Gaines said. "We had to squeeze our data onto the screen. Bytel personnel told us that a Cogen enhancement should solve this problem. Another problem was function-key syntax. Certain keys have unique uses that were difficult to remember. Templates helped solve this problem," she explained.

While Paragon's accounting needs are not common, they are not unique either, and some of Paragon's customers expressed interest in its package.

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Conference to focus on bypassing access charges

CRYSTAL CITY, Va. — A conference and exhibition for telecommunications professionals titled "Bypassing Access Charges" will take place Feb. 28-29 at the Hyatt Regency Hotel here.

The conference will focus on "the timing and impact of the bypass options available today as the only challenge to unfair or 'loaded' access charges," according to conference sponsor Telestrategies, Inc.

Mark S. Fowler, chairman of the Federal Communications Commission, will discuss "New Telecommunications Services and Local Telephone Bypass: The FCC Perspective," as the featured speaker at the Feb. 28 luncheon.

Twenty other speakers from private industry and government will address a variety of telecommunications topics.

The exhibition will feature such technology and services as private, high-speed, digital microwave; satellite transmission; two-way CATV; fiber optics; digital termination systems; and cellular, mobile radio telephone.

A day-long, preconference seminar on "Applying Bypass Technologies to Reduce Access Charges" will be conducted Feb. 27 by Dr. Jerome Lucas, president of Telestrategies.

Registration for the preconference seminar is $495. The two-day conference costs $795. Registration for the seminar and conference costs $1,095. Group discounts are available.

More information is available from Telestrategies through P.O. Box 1218, McLean, Va. 22101.

Cincom meet to explore new tech

CINCINNATI — "Keeping Your Organization on the Leading Edge of Software Technology" is the theme of Cincom Systems, Inc.'s Technical User Conference to be held here March 4-8. The conference will feature presentations by Cincom personnel, introduction of new products and more than 35 classes.

Advanced class offerings will focus on the latest developments in major Cincom products including TIS, Ultra, Manufacturing Resource Planning System and Mantis.

The cost of the conference is $825 per person. Cincom is located at 2300 Montana Ave., Cincinnati, Ohio 45211.

IDC slates briefings in six cities

FRAMINGHAM, Mass. — International Data Corp.'s (IDC) 19th annual one-day Information Industry Briefing Session will focus on integrating microcomputers with mainframes when it is held in six cities in early March.

Scheduled topics include a technology update for 1984 and how users perceive micro-to-mainframe connections.

The seminar is scheduled March 2 at Boston's Copley Plaza Hotel; March 5 at the Crystal City Hyatt Regency in Washington, D.C.; March 7 at Chicago's O'Hare Hyatt Regency; March 9 at the Lincoln-Radisson in Dallas; March 12 at the Los Angeles Airport Hyatt; and March 14 at the Red Lion Inn in San Jose, Calif.

The briefing session costs $475 for one person and $395 for each additional attendee from a company.

IDC is located at Five Speen St., Framingham, Mass. 01701.

Ross Gear shifts to automatic with CAD

LEBANON, Tenn. — A computer-aided design (CAD) system is helping to slash the time spent in designing tooling for manufacturing trucks at the Ross Gear Division of TRW, Inc. here.

Ross Gear produces steering gears at three locations for such heavy-duty truck customers as Ford Motor Co., General Motors Corp., Mack Trucks, Inc. and International Harvester Co. Prior to 1982, its process planning and tool design work was not automated, although the company said it had been considering doing so for a number of years.

Ross Gear first began to consider automating its tooling design work in 1979 in hopes of increasing productivity and improving the quality of work, according to Michael Russell, manager of manufacturing engineering at the plant here. "We were looking for something that would integrate into the total product design in every area and that would give a common data base that could be accessed simultaneously by the product engineer, the process engineer and the tool designer," he added.

After examining systems from a half-dozen major corporations offering computer graphics systems, Ross Gear chose IBM's Computer Augmented Design and Manufacturing (Cadam) system. The integrated graphics system enables users to draw geometric designs on a display terminal; the drawings can be stored and retrieved and used in manufacture of the product.

Under one mainframe

Cadam was chosen in part because it was one of two systems at the time that could link up all the plants and the headquarters under one mainframe, according to John Shaw, division chief engineer for technical services at the Lafayette, Ind., headquarters. "Since they both used IBM hardware, we decided to go fully IBM and chose its Cadam," Shaw said.

The system, installed over a six-month period in 1982, includes a 4331 mainframe, three 3258 and six 3255 controllers and 12 Model 3251 monochrome graphics workstations. Because of the system, product quality has improved significantly, Russell said, explaining that engineers can calculate the manufacturing tolerances of moving parts better than they could by hand. Specifically, with the Cadam system, engineers do in minutes, with greater accuracy, detailed design functions that previously took hours to do on a drafting board.

The system here is part of a Cadam network linking three Ross Gear locations. Gears are designed in Lafayette and produced in plants located adjacent to the Lafayette headquarters and in Lebanon and Greeneville, Tenn. The Cadam systems are connected by high-speed telephone lines to the IBM 4331 central computer in Lafayette, which transmits designs to the other locations.

"We can all look at the design displayed on a terminal in each location, make suggestions and know what each other is talking about," Shaw said.

In the year that Ross Gear has used the system, productivity has jumped noticeably. "Engineers can create twice as many new gear designs as before and can redesign three times as many existing gears with the system," Shaw noted.

As an engineering tool, according to designer Jerry Garrett of the Lebanon plant, Cadam is one of the best he's seen. "It's 10 times more accurate than anything you could do by hand," he said. Garrett uses a light pen to draw tool designs directly on the computer's terminal screen.

Interface '84 scheduled for March 12-15 in Las Vegas

LAS VEGAS — Interface '84, the 12th annual conference and exhibition for data communications, data processing and MIS professionals, will be held March 12-15 at the Las Vegas Convention Center here.

More than 200 industry experts are scheduled to speak at Interface '84. Conference sessions and papers will cover such topics as the impact of the AT&T divestiture, information management, network optimization, digital private branch exchange growth, local-area networks and network software, according to a spokesman for the conference.

The exhibition will include more than 1,200 exhibit spaces featuring data processing products and services.

The conference is being produced by The Interface Group, Inc. and co-sponsored by *Business Week* and *Data Communications* magazines.

Tickets for the four-day conference are $225. One-day conference tickets cost $125. Tickets to the exhibition only are $25.

Industry awards banquet

For an additional $45 per person, attendees can purchase tickets to an industry awards banquet to be held in conjunction with Intefface '84. Limited seating is available. Banquet tickets must be reserved and prepaid by March 5 to guarantee preferred seating.

Special hotel accommodations and airline fares are available.

More information is available from The Interface Group, which is located at 300 First Ave., Needham, Mass. 02194.

NEWS

Bank trims microfilm costs with switch to dry COM

SAN FRANCISCO — By converting much of its computer output operation from a mix of paper printers and wet computer output microfilm (COM) to dry, on-line COM devices, Wells Fargo Bank here reportedly slashed more than $250,000 from its annual tab for generating some one billion lines of microfilm per month.

As a result, the organization is now better positioned to generate reports and information in a timely manner, according to Reuben Barrera, an analyst at Wells Fargo here.

"Management wanted us to develop a plan to use COM effectively during the 1980s," Barrera said. "Three fundamental goals sum up that plan. First, we had to accommodate increased COM usage. Second, we had to cut costs. Third, we wanted to take advantage of the latest technology [in order] to attain goals one and two."

Much of the impetus for increased COM usage stemmed from the fact that, prior to the conversion, the bank generated as much output on six laser nonimpact printers as it did on its four wet COMs. Yet it did this at a substantial premium: The nonimpact printers cost three times as much as the COM equipment, and supplies cost four times as much.

More effective way needed

Growth projections and economics dictated that a more effective way be found. With added use of paper printers ruled out, the basic avenues open to the bank were to continue with the wet COM technology or upgrade to more current dry technology — laser COM devices — available in either on-line or off-line configurations. Dry COM eliminates the chemical handling and processing required with wet COM.

In late 1981, Wells Fargo began to compare the advantages of adopting dry COM technology to that of adding more wet COM units and found that the dry technology would cost at least $20,000 a month less to operate. For the comparison, the bank used an Eastman Kodak Co. Komstar 200 microimage processor — a device that uses a laser-imaging method — and heat-processed microfilm.

In addition to cost, a number of other factors weighed against wet COM:

- Personnel requirements differed sharply between the two technologies. With wet COM, it was estimated the bank would have to hire up to five more COM operators in 1982 alone. "We had problems keeping a full staff due to high turnover," Barrera said. "Given the special skills needed for wet COM operators, it became a difficult challenge to train staff continually."
- The costs of wet COM production would grow almost proportionately to the increase in volume. Waste could run as high as 50% some months due to tape problems causing reruns and processing control. "We simply needed to find a way to improve productivity," Barrera said.
- The bank's tape library was bulging with tapes needed for wet COM processing. Some regular COM jobs created 120 magnetic tapes each time they were run; with the volume of COM jobs rising, so would the number of tapes.

After selecting dry COM technology, the bank had to choose between an on-line and off-line configuration as well as the vendor that could best meet its objectives.

The need to control tape usage favored on-line COM. "Perhaps the biggest factor in favor of on-line COM was the need to integrate COM operations into the mainstream of the DP output operation," Barrera said.

When the bank compared the Komstar 200 with other on-line op-

See BANK page 48

Videotex meet set

ROSSLYN, Va. — "Forum on Unauthorized Access," a 1½-day conference, is scheduled for February 28-29 at the Hyatt Arlington Hotel here.

Sponsored by the Videotex Industry Association (VIA), the forum will look at enforcement, legislation and public awareness of unauthorized access to videotex systems. George M. Minot, senior vice-president of Compuserve, Inc. in Columbus, Ohio, is the forum chairman.

Attendance is limited to 72 people. The cost is $395 for VIA members and $695 for others. VIA is located at Suite 200, 1901 N. Fort Meyer Drive, Rosslyn, Va. 22209.

Feb. 23 seminar to cover AI trends

SCOTTSDALE, Ariz. — DM Data, Inc. has announced a one-day Artificial Intelligence Trends '84 Seminar here on Feb. 23.

Howard Dicken, president of DM Data, will discuss the present market and the companies actively engaged in the five major categories of AI: expert systems, visual, recognition, computer-aided instruction and natural language software. He will discuss current trends and future markets and products.

Also scheduled is Dr. Nicholas Findler, research professor of computer sciences and director of the Group for Computer Studies at Arizona State University, who will discuss the basic fundamentals of AI and potential applications.

The seminar fee is $225, which includes luncheon and class notes. Further details are available from the seminar secretary, DM Data, Suite 700, 6900 E. Camelback Road, Scottsdale, Ariz. 85251.

BANK from page 47

tions, it estimated the Kodak unit would cost about $30,000 less and offer greater capacity. The Kodak units were plug-compatible with the bank's computer operation and transparent to the printer spooling system. In addition, both the Komstar hardware and software had established a solid reputation for trouble-free performance, Barrera said.

The bank now has nine Komstar units for production applications, generating two-thirds of the bank's total monthly output. In a normal month, each Komstar produces about 3.5 million pages of output, but at peak times the average can be as high as 4.2 million pages per unit.

"We use the COM equipment for all demand deposit account reports, branch-type output, bank card journals and statements and a number of other production reports," Barrera said. The customer statements mailed to account holders are about the only paper generated in this process.

The move to the on-line COM exceeded management's goals of increasing COM usage and reducing costs. "Staffing for wet COM required six operators on each shift — a minimum of 18 people. Today we have 12 operators, and we produce about 20% more data," Barrera said. He predicts further staff savings this year as the bank implements plans to relocate the duplicators to the printer pool floor and cross-train the COM staff with paper-output personnel.

In addition to reducing personnel and waste, "The compaction capability of the Komstar has enabled us to achieve a 26% savings in supplies," Barrera noted. "The laser technology allows us to average 210 frame/fiche vs. the 156 frame average of the CRT technology." Also, the operation now creates about 500,000 duplicate fiches each month, which compares to 800,000 a month in the past — a 37% reduction in duplicating costs.

Four Kodak Photomatrix 8955 autoload duplicators are used to produce copies in San Francisco, and one Photomatrix and a Kodak Ektafiche Duplicator are utilized in Los Angeles.

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Dairy skims costs by giving managers micros

BARABOO, Wis. — The desire for greater cost efficiencies and improved patron service led a top dairy cooperative, located smack in the middle of the nation's dairyland, to buy microcomputers for its managers.

Wisconsin Dairies, a new member of the Fortune 500 with 1983 revenues of $448 million, chose Honeywell, Inc.'s Microsystem 6/10. The micros not only offer the cooperative's managers personal computing capabilities, but also function as end points in the cooperative's network.

Wisconsin Dairies, which consists of 11 manufacturing plants, handles about 2.5 billion lb of milk from four states every year. The plants have a total daily processing capacity of 7.8 million lb of milk, and the Richland Center, Wis., operation can produce 180,000 lb of cheese a day.

Because of the mammoth operation, plant managers last year became interested in using computer-based management tools. Before they received micros, the plants' data processing needs were served by terminals that were linked via communications lines to a Honeywell Level 6 minicomputer at the cooperative's Baraboo headquarters. The terminals could perform the data entry functions the plant required, but without decision support capabilities.

"Our plant managers were looking for a system that would help them generate information they could use on a day-to-day basis to manage their operations. In many cases, they couldn't afford to wait for reports from headquarters," said Susan Frish, Wisconsin Dairies' data processing manager.

A search by Frish and her staff for a microcomputer to replace the terminals ended with the Microsystem 6/10 with an Intel Corp. 8086 processor option.

"The 6/10 has the same operating system as the minicomputer we have at headquarters, so we knew we could communicate to a host easily. In addition, with compatibility we didn't have to fear upgrades," Frish said.

Initially, the new systems served as a data entry operation that is the basis of the dairy cooperative's complex patron payroll system. The plants receive milk from a network of milk haulers who make pickups at each of more than 5,000 patron farms served by the cooperative. Milk haulers keep track of pickups on tickets that record the date, patron number and weight of the milk.

When the haulers deliver the milk to the plants, the ticket data is entered into the microcomputers, and the systems check the haulers' figures for accuracy. The information then is transferred to the minicomputer in Baraboo, where it is used to help determine each patron's monthly or biweekly milk check and voucher.

Additionally, patron stores at each plant location dispense such supplies as butter and cheese as a service to cooperative members. The haulers deliver the items to the patrons upon request, filling out information on the delivery on supply tickets. The information also is entered in the microcomputers, following which it is electronically transferred to headquarters where it is factored into the payroll calculations.

Plans are under way to transfer part of the patron master file to each of the microcomputers at the plants so that plant management will have vital patron information at its fingertips in dealing with farmer inquiries.

Frish said the microcomputers also will be used for inventory control and product tracking to enable plant management to improve cost control measures.

Micro applications top newest book trends

By J. Daniel Couger
Special to CW‡

Noteworthy among the more than 300 computer books published in 1983 is the improvement in books on system design and advanced programming. However, the 17th edition of the *Annual Bibliography of Computer-Oriented Books*, released this month by the University of Colorado, lists only 265 of those books. Omitted from the bibliography are 52 "inadequate" books published on micro and personal computing; included in the bibliography are 34 very good books on that subject.

Another area of continued improvement, for the second year in a row, is the category of management of data processing. Inmon's book *Management Control of Data Processing* is an example. Ten new books were added to that section.

Programmer Productivity (Arthur) and *Software Testing Techniques* (Beizer) are examples of the high-quality books that are published in the advanced programming category.

Brackett's *Developing Data Structured Information Systems* and Brill's *Building Controls Into Structured Systems* are examples of the improved books in the system design category.

The newest trend in applications-oriented books is not surprising — it is the large number devoted to micro-based applications. Nor is it surprising that electronic spreadsheet books dominate.

All introductory books published prior to 1980 were deleted from the bibliography. Despite the deletions, the bibliography still contains more than 1,200 books from 173 publishers. The bibliography separates the books into 86 categories and catalogs them according to type (reference, textbook, handbook) and style of presentation (programmed instruction, case study or narrative).

Over half of the new personal computer books were related specifically to the IBM Personal Computer. An example of the excellent new books of this type is Pollack's *Programming the IBM PC in UCSD Pascal*.

In the general microcomputer category, McGlynn's *Simplified Guide to Small Computers in Business* maintained this author's reputation for excellence.

The newest trend in applications-oriented books is not surprising — it is the large number devoted to micro-based applications. Nor is it surprising that the electronic spreadsheet books dominate. Nine of the applications books are devoted to that subject.

Representative of the good books in other application areas is *Forecasting on Your Microcomputer* by Nickell. The nonmicro area was enhanced by books like Bodnar's *Accounting Information Systems* and Jarrett's *Computer Graphics and Reporting Financial Data*.

Because of space limitations, the only application books included in the bibliography concern business uses of the computer. Nevertheless, there are 27 new books in that category.

As would be expected, the office automation category continued to evidence rapid growth. The three Peter McWilliams books are a refreshing addition to that category.

Another quality addition is Forbe's *Word Processing Procedures for Today's Office*.

Ninety-six books are listed in the advanced programming category, including 12 new books. In addition, another 54 books are provided in the categories on operating systems, maintenance programming, microprogramming and structured programming. *The Structured Alternative* (Cassel) illustrates the solid additions to the latter category.

Introductory books on languages continue to proliferate. Books on Basic predominate (51), but Pascal is closing in (37). With six books, Forth now justifies a section of its own.

New language books include *Smalltalk-80* (Goldberg and Robson) and *Icon Programming Language* by Griswold and Griswold. Because of space limitations, most books on DP management published before 1980 were deleted. Despite these deletions, the category on management of data processing contains 65 titles. Valuable additions *The Politics of Projects* (Block) and *Measurement and Tuning of Computer Systems* (Ferrari).

The management category is subdivided as follows: computer performance, project management, personnel performance, system security and general management.

In addition to the aforementioned books, the new James Martin book, *Managing the Data Base Environment*, and the Atre book, *DBMS for the Eighties*, strengthen the system design category. The data base section now contains 63 entries; the data communications section contains 34 entries.

One of the better entries to the latter communications category is *Tutorials in Modern Communications* by Lawrence.

Other useful additions to the system design category are *Computer Systems Requirements* (Thurber and Patton) and *The Architecture of Videotex Systems* (Gecsei).

In the decision support systems/MIS area, *MIS Design Variables and Decision Making* (Jenkins) is the premier addition. That section now contains 35 titles.

The history/future section of the bibliography has 12 additions since 1980. Of the newest, *The Naked Computer* (Rochester and Grantz) is the most interesting, while *The Fifth Generation* (Feigenbaum and McCorduck) is the most informative.

The artificial intelligence section now contains 17 titles, and the robotics section contains seven titles.

A robust section is graphics, with 12 new books. The "oldest" book was published in 1978. The new books in the graphics section range in sophistication from *PC Graphics* (Conklin) to *Formal Specification of Interactive Graphics Programming Language* (Mallgren).

The lack of new books in several important areas may be indicative of the lack of progress of computing in those areas.

The section on computers and society had no 1983 additions. Nor did the sections on marketing and government applications.

One hopes that some creative work is nearing completion in those areas.

Copies of the bibliography are available for $4 from "Computing Newsletter," Box 7345, Colorado Springs, Colo. 80933. The cost is $6 if an invoice is required.

Couger is distinguished professor of computer and management science at the University of Colorado.

NEWS

System measures field of vision

DURHAM, N.C. — Ophthalmologists at Duke University Medical Center here have begun using a computer to measure the field of vision in patients with glaucoma. Installed last summer, the computer is used on approximately 30 patients weekly.

According to a spokesman, the computer system is a vast improvement over previously used methods of measuring peripheral vision, the loss of which is one of the earliest signs of glaucoma. The computerized instrument still requires the response of the patient, but the examiner is partially replaced by the computer.

The Octopus 2000R computer, made by Cilco Corp. of Huntington, W. Va., utilizes Zilog, Inc.'s Z80A microprocessor with 64K bytes of memory and operates on Digital Research, Inc.'s CP/M operating system. The software was developed at the University of Bern, Switzerland.

The patient looks into a bowl while the computer automatically presents tiny spots of light in different parts of the bowl, and the patient is asked to indicate when test spots are seen. The computer can tell whether the patient is staring ahead, and it will double or triple check spots that the patient indicates he cannot see.

At the end of the test, the computer charts the patient's responses, giving the ophthalmologist a precise picture of the patient's range of vision.

Crwth offers training curriculum

SANTA MONICA, Calif. — Crwth Computer Coursewares has introduced a curriculum of interactive, computer-based training for users of Scholar/Teach 3, a computer-based training development and presentation system.

The system runs on IBM and IBM-compatible medium- and large-scale mainframes.

Courses now available are "Introduction to Data Processing," "Introduction to the Information Center," "Introduction to Data Communications," "Developing DP Skills for End Users," "SPF for End Users," "Using Focus" and "Using SAS."

"Using ADRSII" and "Using Answer/DB" will be released soon, the vendor said.

The courses are available for a 30-day free trial and can be leased with a yearly license ranging in cost from $1,200 to $3,700 or purchased with a yearly license ranging from $3,000 to $8,400.

More information is available from Crwth at Suite 200, 613 Wilshire Blvd., Santa Monica, Calif. 90401.

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How the Stratus Hardware Solution Supersedes the Software Solutions.

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An added benefit of the Stratus fault tolerant design is that you can expand your system with additional processors as your computing needs grow. In fact, you can have up to 32 fault tolerant processors, 2000 communication lines, and 100 billion bytes of storage in a single Stratus system.

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CALENDAR

WEEK OF MARCH 4

MARCH 5-9, NEW YORK — **Structured Design and Programming Workshop.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 5-16, PARSIPPANY, N.J. — **ANS Cobol.** Contact: Chubb Institute, 8 Sylvan Way, Parsippany, N.J. 07054.

MARCH 6, BOSTON — **Computerized Personnel/Payroll Seminar.** Contact: Carol A. Koschak, Insci, 95 Chestnut Ridge Road, Montvale, N.J. 07645. Also being held March 6 in Huntsville, Ala., March 7 in Omaha, March 8 in San Jose, Calif., West Orange, N.J., and Greensboro, N.C., and March 13 in Anaheim, Calif.

MARCH 6-7, PITTSBURGH — **The 1984 Tri-State Telecommunications Exhibition.** Contact: W.C. Hunkele, Telecommunications Management Association, P.O. Box 8839, Pittsburgh, Pa. 15221.

MARCH 6-8, CARY, N.C. — **SAS Exploratory Multivariate Data Analysis Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

MARCH 6-8, WASHINGTON, D.C. — **Getting Ahead With Micros.** Contact: The U.S. Professional Development Institute, Microcomputers in Government, Department AB, 1620 Elton Road, Silver Spring, Md. 20903. Also being held March 13-15 in Denver, March 20-22 in New York and March 27-29 in Seattle.

MARCH 6-9, LOS ANGELES — **The National Data Base and Fourth-Generation Language Symposium.** Contact: Digital Consulting Associates, Inc., 339 Salem St., Wakefield, Mass. 01880.

MARCH 6-9, PALO ALTO, CALIF. — **Data Communications.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

MARCH 6-9, LOS ANGELES — **Programming in C: A Hands-On Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

MARCH 6-9, WASHINGTON, D.C. — **Structured Design and Programming.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held March 27-30 in San Diego.

MARCH 6-9, BOSTON — **How to Manage Software Projects.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held March 20-23 in Palo Alto, Calif.

MARCH 6-9, PALO ALTO — **Defining Software Requirements, Specifications and Tests.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held March 27-30 in Boston.

MARCH 7, CHARLOTTE, N.C. — **Planning a Manufacturing Information System.** Contact: Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, Mich. 48121.

MARCH 7-8, CARY, N.C. — **SAS Color Graphics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

MARCH 7-9, SAN FRANCISCO — **Local-Area Networks.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held March 14-16 in Boston, March 21-23 in Philadelphia and March 28-30 in San Diego.

MARCH 7-9, WASHINGTON, D.C. — **Structured Analysis and Design.** Contact: McCabe and Associates, Inc., Suite 111, 5501 Twin Knolls Road, Twin Knolls Professional Park, Columbia, Md. 21045.

MARCH 7-9, STAMFORD, CONN. — **Layered Network Architecture and ISO Seven Layer Standards.** Contact: Data-Tech Institute, 386 Franklin Ave., P.O. Box 569, Nutley, N.J. 07110. Also being held March 14-16 in Detroit, March 21-23 in Boston and March 28-30 in Orlando, Fla.

MARCH 8-9, STAMFORD, CONN. — **Digital PABX: Architectures, Networks, Systems.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held March 22-23 in Washington, D.C.

MARCH 8-9, SAN DIEGO — **The Spring 1984 Conference for Computers in Construction.** Contact: CIP Information Services, Inc., 1105-F Spring St., Silver Spring, Md. 20910. Also being held March 22-23 in New York.

MARCH 8-9, PHOENIX — **Personal Computer Local Networks.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424. Also being held March 15-16 in Atlanta and March 29-30 in Washington, D.C.

MARCH 8-10, ACAPULCO, MEXICO — **The 1984 Computer Dealer and Lessor Association Spring Meeting.** Contact: Computer Dealers and Lessors Association, 1212 Potomac St. N.W., Washington, D.C. 20007.

WEEK OF MARCH 11

MARCH 12, STAMFORD, CONN. — **Planning for XA: An Unbiased Analysis.** Contact: Techtran, 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904. Also

being held March 13 in New York, March 14 in Toronto and March 16 in San Francisco.

MARCH 12-13, HOUSTON — **Digital Private Automatic Branch Exchange.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held March 15-16 in San Francisco, March 26-27 in Baltimore and March 29-30 in Boston.

MARCH 12-13, CHICAGO — **Managing Projects in the Structured Environment.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 12-13, SAN FRANCISCO — **IMS/CICS.** Contact: Comped Technical Corp., 10 E. 21st St., New York, N.Y. 10010. Also being held March 14-15 in Los Angeles.

MARCH 12-13, RALEIGH, N.C. — **Dbase II.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

MARCH 12-13, SAN DIEGO — **Introduction to SPSS-X for New Users.** Contact: SPSS, Inc., 444 N. Michigan Ave., Chicago, Ill. 60611.

MARCH 12-14, SAN FRANCISCO — **Data Communications: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

MARCH 12-14, ORLANDO, FLA. — **Data Communications Systems.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

MARCH 12-14, PHILADELPHIA — **Managing Application Software Support.** Contact: Infosci, Inc., Box 7117, Menlo Park, Calif. 94026.

MARCH 12-14, WASHINGTON, D.C. — **Software Quality Assurance and Testing.** Contact: U.S. Professional Development Institute, Software Development in Government, Department A, 1620 Elton Road, Silver Spring, Md. 20903.

MARCH 12-14, WASHINGTON, D.C. — **Data Communications: Effective Network Design.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

MARCH 12-14, DAYTON, OHIO — **Personal Computers and Networking.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

MARCH 12-14, PHOENIX — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 12-14, SAN FRANCISCO — **Telecommunications Management: Equipment.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

MARCH 12-14, CHICAGO — **Microcomputers: A Guide to Selection and Application.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

MARCH 12-14, NEW YORK — **Data Base Management Systems: Concepts and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

MARCH 12-14, WASHINGTON, D.C. — **Data Dictionaries: Concepts, Contents and Uses.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

MARCH 12-14, WASHINGTON, D.C. — **Local-Area Computer Networks.** Contact: The George Washington University, Washington, D.C. 20052.

MARCH 12-14, BOULDER, COLO. — **Soft Side of Software.** Contact: Cross Information Co., Suite B, 934 Pearl, Boulder, Colo. 80302.

MARCH 12-14, LOS ANGELES — **Micro and Personal Computers: Techniques and Applications.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

MARCH 12-14, WASHINGTON, D.C. — **Computer Awareness: Basic Concepts, Capabilities and Terminology.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

MARCH 12-14, WASHINGTON, D.C. — **Distributed Telecommunications Networks.** Contact: The George Washington University, School of Engineering and Applied Sciences, Washington, D.C. 20052.

MARCH 12-14, WASHINGTON, D.C. — **Decision Support Systems.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

MARCH 12-14, ATLANTA — **Purchasing Management and the Computer.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

See MARCH page 58

EVERY COMPUTER COMPANY TALKS SERVICE UP FRONT. BUT HOW MANY OF THEM CAN BACK IT UP?

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MARCH from page 55

MARCH 12-15, SUNNYVALE, CALIF. — **Structured Analysis and Systems Architecture Seminar.** Contact: Janis Halsted, Oberland Associates, 4036 N.E. Sandy Blvd., Portland, Ore. 97212.

MARCH 12-15, MINNEAPOLIS — **Data Base Administration and Control Workshop.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

MARCH 12-15, CHICAGO — **Dbase II.** Contact: Alexandra Communications, 661 Massachusetts Ave., Arlington, Mass. 02174. Also being held March 14-18 in Atlanta.

MARCH 12-15, TORONTO — **Project Management.** Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20814.

MARCH 12-16, WASHINGTON, D.C. — **Hands-On Pascal Computer Programming.** Contact: The George Washington University, Washington, D.C. 20052.

MARCH 12-16, CONCORD, MASS. — **Unix Workshop.** Contact: Plum Hall Associates, 1 Spruce Ave., Cardiff, N.J. 08232.

MARCH 12-16, FORT WORTH, TEXAS — **The 25th National Computer Security Seminar and Workshop.** Contact: Data Processing Security, Inc., Education Department, 200 E. Loop 820, Fort Worth, Texas 76112.

MARCH 12-16, NEW YORK — **Systems Analysis and Design Workshop.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

MARCH 12-16, DALLAS — **MVS Systems Management.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

MARCH 12-16, CHICAGO — **MVS JCL.** Contact: Sysed, One Park Ave., New York, N.Y. 10016.

MARCH 12-16, SAN FRANCISCO — **Structured Analysis and Design.** Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

MARCH 12-16, ORLANDO, FLA. — **Vsam Programming.** Contact: Harris Education Center, 6220 S. Orange Blossom Trail, Orlando, Fla. 32809.

MARCH 12-16, HARTFORD, CONN. — **Structured Analysis and Design Workshop.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 12-16, NEW YORK — **Auditing in the Contemporary Computer Environment.** Contact: Marge Umlor, EDP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60187.

MARCH 12-16, DETROIT — **Structured Analysis and System Specification Workshop.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held March 12-16 in Miami, Minneapolis and Phoenix.

MARCH 12-16, HOUSTON — **Project Management and Control Workshop.** Contact: Learmonth and Burchett Management Systems, Inc., Suite 405, 2800 N. Loop W., Houston, Texas 77092.

MARCH 12-16, TRUMBULL, CONN. — **Introduction to Unix.** Contact: Gregory Geiger, Bunker Ramo Information Systems, Trumbull Industrial Park, 35 Nutmeg Drive, Trumbull, Conn. 06609.

MARCH 12-16, ATLANTA — **Structured Analysis for Real-Time Systems.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held March 12-16 in Chicago.

MARCH 12-16, NEW YORK — **Data Base Development.** Contact: Learmonth and Burchett Management Systems, Inc., Suite 405, 2800 N. Loop W., Houston, Texas 77092.

MARCH 12-16, SEATTLE — **Structured Design Workshop.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 12-16, TRUMBULL, CONN. — **C Programming.** Contact: Gregory Geiger, Bunker Ramo Information Systems, Trumbull Industrial Park, 35 Nutmeg Drive, Trumbull, Conn. 06609.

MARCH 12-16, ANAHEIM, CALIF. — **Structured Design and Programming Workshop.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held March 12-16 in Oklahoma City and Washington, D.C.

MARCH 12-16, SAN DIEGO — **Structured Design for Real-Time Systems.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 12-16, MILWAUKEE — **Information Modeling Workshop.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 12-16, DENVER — **Project Planning and Control Workshop.** Contact: J. Baldwin, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

MARCH 13, ORLANDO, FLA. — **SDM/Structured Free Seminar.** Contact: Mary Aliano, AGS Management Systems, 320 Walnut St., Philadelphia, Pa. 19106.

MARCH 13-15, DETROIT — **Micro/Set '84 Microcomputer Expo for Science, Engineering and Technology.** Contact: Micro/Set '84, Engineering Society of Detroit, 100 Farnsworth, Detroit, Mich. 48202.

MARCH 13-15, ARLINGTON, VA. — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

MARCH 13-15, ATLANTA — **Focus on Data.** Contact: Du Pont Statistical Seminars, Room X-40236, Wilmington, Del. 19898.

MARCH 13-15, CARY, N.C. — **SAS for New Computer Users (VS/CMS).** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

MARCH 13-15, LOS ANGELES — **The Second Technology Opportunity Conference: Optical Storage of Documents and Images.** Contact: Technology Opportunity Conference, P.O. Box 14817, San Francisco, Calif. 94114.

MARCH 13-15, MELBOURNE, AUSTRALIA — **The First Australian Telecommunications Exhibition and Conference.** Contact: Riddell Exhibition Promotions Pty. Ltd., 137-141 Burnley St., Richmond, Victoria, 3121, Australia.

MARCH 13-16, BOSTON — **Data Base Management Systems: Mini, Micro and Distributed Applications.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

MARCH 13-16, LOS ANGELES — **Microprocessor Software, Hardware and Interfacing.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held March 27-30 in Baltimore.

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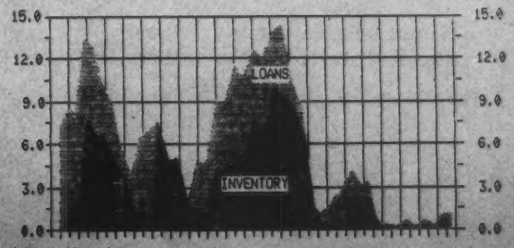

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EDITORIAL

Vendor schemes that backfire

Storage Technology Corp.'s recent decision to abandon development of an IBM-compatible mainframe should be studied as a warning of the pitfalls that await vendor and user alike as technology advances evermore rapidly.

Until very recently, STC had boasted, and evidently believed, it could broaden its stake in an increasingly cutthroat business by developing yet another high-performance, IBM-compatible processor. The machine had a planned shipment date of late 1984, which was just recently pushed back from early 1984. Although the company cited technological problems [CW, Feb. 6], it apparently felt that even with just a short delay, the product would no longer be competitive.

The cancellation of the STC project was, unfortunately, not a unique incident for users who make current purchase decisions with one eye focused on forthcoming products. For example, Trilogy Ltd. announced long ago it would ship an IBM-compatible mainframe with new technology in 1985; just last month it announced a brief delay in completing the prototype wafer-scale semiconductor that will be crucial to the new machine.

In this case, vendors are also experiencing what it's like to be on the receiving end. Both Digital Equipment Corp. and Sperry Corp. made substantial investments for rights to Trilogy's still unproven technology that may or may not bring processing to a new plateau.

Given the increasingly breathtaking pace of new developments in processing power and applications, it is not surprising that vendors feel compelled to "overpromise" products. The juices of competition are leading to greater dependence on the marketing tactics of Madison Avenue rather than that good old American tradition of proving oneself with actual performance in the marketplace.

You may call it "selective leaking" or you may call it "intrepid reporting," but the fact is that products are being heralded even before a prototype has a chance to power up.

The microcomputer market recently demonstrated dynamics that inevitably will be felt throughout the processing hierarchy. Months of speculation about IBM's PCjr wreaked havoc upon the micro marketplace, then Apple Computer, Inc.'s masterful manipulation of both the trade and the general press served to detract attention from developments by other vendors that might have just as much significance if only given a chance.

When it comes to software, vendor claims seem to be going beyond mere boasting to a possible disregard for ethics. Mainframe-micro linkages are announced weekly, but how many management information systems directors will tell the corporation president he can start manipulating mainframe data from his desktop? Packages that merely contain a new wrinkle to existing technology are heralded as stunning breakthroughs, yet a systems planner for a major corporation told a conference recently that his major gripes are "me-too" packages and "unfinished products" that don't perform as promised.

Users have been indoctrinated to expect breakthroughs, and they certainly must consider what may be coming down the pike when they are planning long-term strategies for their DP shops. But while vendors certainly have every right to scratch to stay in business, they run the risk of disillusioning users to the point that they dare not make a decision revolving around a "forthcoming" product for fear that, at best, it will not work as promised or, at worst, that it will never appear at all.

LETTERS TO THE EDITOR

Your Social Security number: the downfall of individual privacy?

Computerworld's year-end issue included the article "Privacy issues in 1984" [CW, Dec. 26/Jan. 2]. Last fall, *Computerworld* featured the editorial "Silent watchers" [CW, Sept. 12]. And in earlier issues, there were numerous articles included in *Computerworld* that focused on the issue of hacking.

In all the articles written on computer abuse relative to individual privacy, one consideration has been overlooked, that is, that we have given the abuser one very important tool that should be taken away; we have given the abuser a unique identifier.

Today, your social security number is used as an identifier for just about everything.

Your social security number is used for credit applications, medical services, group insurance, a driver's license, nonincome-related employment personnel records, to be a "block home" — the list goes on.

Furthermore, there are no restrictions placed on the use of the social security number by private industry or state government.

What is needed is a law that restricts the use of the social security number to reporting income to a taxing authority or to give a social security benefit.

Michael Stack
Beaverton, Ore.

***Computerworld** welcomes letters from its readers. Preference will be given to typed, double-spaced letters of 150 words or less; they may be edited for the purposes of clarity and brevity.*

*Letters should be addressed to **Editor, Computerworld, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.***

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VIEWPOINT

The phenomenon of MIS 'plateauing'

THE DATA CENTER

JOHN P. MURRAY

Having observed the pattern of development and change within a number of management information systems (MIS) installations over many years, I have come to the conclusion that many, I suspect most, MIS installations operate in concert with a cyclical rhythm. While the tempo is different from organization to organization, it does indeed appear that certain circumstances create an ebb and flow within the typical MIS department.

As an example, the MIS department reaches a given level of performance that is, for whatever reason, viewed as acceptable. There then begins a slow, at first imperceptible, decline in the overall quality of the MIS service to the organization. Once begun, the decline continues, usually at a slow but steady pace. This continues until a certain stage is reached, often caused by some rather dramatic event, a disaster of some magnitude that finds its way to the senior management level. This is the low point in the cycle.

When it becomes apparent that MIS is indeed in trouble, the effort will begin to do whatever is necessary (an often draconian effort) to bring the situation to an improved state. This is usually an expensive, time-consuming and often frustrating experience for all concerned. The outcome here is movement to the high level of the cycle where, usually, the process begins again.

Is this proposition about the phenomenon of MIS plateaus only some imaginary concept? I submit it is not imaginary, but a fact. Think first of the MIS installations with which you are familiar, then consider the amount of management turnover in those installations and, I believe, you have witnessed the effect of the MIS "plateauing" phenomenon.

Cause of MIS plateauing

What is the cause of this rather universal condition of MIS plateauing? There are a number of causes, but I think a primary cause is that of complacency. This complacency can be found in the client areas, in MIS and in the organization's senior management. Often it is a result of, or perhaps a reaction to, the attainment of a certain plateau. Usually, a great deal of money (or what may appear to senior management to be a great deal of money) will have been spent to bring MIS out of the low trough of the cycle; the MIS environment will be viewed as much improved; and senior management support and, perhaps more importantly, attention will be less forthcoming.

In time, MIS management will either simply stop attempting to alert senior management to the requirement to continue to advance with the technology (that is, keep moving to higher plateaus) and become complacent or move on to organizations that recognize they are in the low cycle and that need help. In either event, the down cycle for this MIS function has begun. It may take a long time; I am aware of two organizations in which it took eight and 10 years, respectively, to recognize the low level plateau that had been reached before appropriate action was taken. I suspect there are organizations with longer cycles, but sooner or later, most down cycles do bottom out.

This bottoming out may not be accompanied by the removal of the MIS manager. Senior management may accept the fact that it must share some of the culpability for reaching this low level and may, provided the current MIS management is competent, supply the support required to begin the climb to higher levels. In any event, sooner or later an effort to move ahead will begin and money will be available to get the job done.

Consider facts

Whether you buy this argument or not, it might not hurt to consider the facts in your own organization. Is progress in terms of the technology, in terms of MIS client understanding of MIS and the potential use of information processing being made? Or are there subtle indications that the MIS environment and its perception outside the MIS department is not as good as it was last year? Is your organization attempting at least to examine the potential of new technology and to attempt to use that technology that shows promise for the organization, or is the climate one of "What we have now is good enough"?

This plateauing phenomenon will become more apparent and the cycles less lengthy as the effective uses of technology expand and as the results of the use of that technology become more apparent. Those organizations that become aware of the cycling phenomenon and that take action to keep the organization heading to increasingly higher plateaus will be the future winners.

MIS functions do not stand still; if they are not moving ahead, not growing and evolving with the expanding technology, they are falling behind. Maintaining the status quo is simply hastening the eventual decline of the MIS function.

While we in MIS management may find the effort onerous, and while at times we all feel that indeed "the game is not worth the candle," we do have a responsibility to continue to push for the growth and development of the MIS function, to maintain the struggle to reach the next higher plateau. We have, I suppose, to accept the reality that our management does not want to address this issue, particularly if things are going reasonably well.

The movement to increasingly higher MIS plateaus can be expensive, both to attain and to continue. However, the investment in the continuous recycling of the MIS department is not only expensive, but it also has a deleterious effect on morale throughout the organization.

More time and attention need to be focused on the MIS plateauing phenomenon and to take steps to continue to move organizations ahead through the effective use of the technology, rather than to become caught up in the recycling syndrome. Time, effort and, perhaps most important, money should be invested in the achievement of ever higher MIS plateaus, not in being forced to start the climb over and over again. And this must be a concerted effort of MIS, clients and senior management. MIS cannot do it alone. ‡

Murray is director of management information services for Rayovac Corp., Madison, Wis., and author of Management Information Systems as a Corporate Resource, *published by Dow Jones-Irwin.*

Will publishing technology enter office system arena?

HUMAN CONNECTION

JACK STONE

C'mon now, who cares if a word processing operator can control the type fonts displayed on the monitor? Granted it is a clever demonstration to see an operator strike a few keys and watch the text shift gears into italics, but my view is that such capabilities, along with all the other complex paraphernalia that goes along with automatic typesetting, has always been the proper province of the publishing industry and not the business office — or so I thought until I ran into John Deaner, who is one of the true pioneers of automation in the publishing industry. Deaner set me straight on the matter.

Deaner, president of the newly established Tele Disk Publishing Co. (a subsidiary of LRC, Annandale, Va.), feels that new technologies have radically cut the cost of computer-based processes to the point where conventional offices will soon be able to afford the equipment.

Here is a summary of what he had to say when I interviewed him:

How can the average office fund such expensive equipment?

Right now, those in small firms cannot. They provide a comprehensive range of facilities — editing, proofreading, graphics design, telecommunications, typesetting, printing and photocopying — but make the process easier and more cost-effective than ever before.

In fact, Tele Disk has been organized as a publishing service bureau to help government and commercial firms accelerate their use of automatic publishing processes in everyday work.

I thought the daisywheel technology and its ilk, working with a photocopier, met the printing and copy needs for the vast majority.

They have in the past and will be around for a long time in the future. But the good old daisywheel machinery just cannot handle the surging demand for graphics, and everybody knows the limitations of line printers for quality work.

Furthermore, phototypesetters are too clumsy in terms of all the chemicals and ancillary equipment that are required.

However, there are extra dimensions of printing quality and speed offered by the new equipment that may be more suitable for the larger organizations.

Take the office-size laser printers, for example. Machines of this type are on the market that are no bigger than a copier, yet provide laser-quality originals from instructions, graphics and text in the form of a simple stream provided by the operator.

Typical machines are capable of producing a high-quality typeset page in a matter of seconds. Believe it or not, text for a 600-page book can be created in a couple of hours, including figures, drawings, line art and charts.

Have these machines improved on the paper loading and transport problems of the conventional copiers?

One machine that is available provides cassette loads of plain paper so that the output looks more like printed pages, not photoduplicated printout.

More impressive than this is that substantial savings in paper costs are possible by using compressed text and, thereby, compacting it on the page — a technique long used in the publishing industry to cut paper costs.

And new justification techniques, coupled with textbook-quality type fonts, make the compacted formats very attractive and easier to read as well.

But can these machines be cost-justified for routine office correspondence?

Of course, it depends on the volume requirements of the organizations, but the opportunities for cost, quality and performance improvements are legion.

Imagine storing the company logo in random-access memory instead of hard-copy letterhead or using a microchip instead of a stockroom to produce standard forms.

I'm guessing that many installations may wind up being cost-justified on the basis of cost savings of paper storage alone. ‡

Letters to Stone should be addressed to him at P.O. Box 33699, Washington, D.C. 20033.

Hackers: Hired guns of the high-tech age?

READER'S PLATFORM

R. RAJAGOPAL

Lately, we have been hearing a lot about hackers, mostly high school and college students who get their thrills by hacking away at different computer passwords or identification codes until they gain access to a computer somewhere in the country. By further hacking, it is possible, though not likely, for them to gain access to the computer's files or data bases. What do the parents of these kids do when the telephone bills arrive?

I do not condone professional criminals who, by hacking or other means, attempt to gain access to privileged information; they ought to be put behind bars. Nor am I defending the illegal activities of high school and college hackers who gain entry into other computer systems by trial and error for the sheer fun of it. I am interested in rechanneling the energies of the hackers who are harmless pranksters. Many times I wish I had the services of a hacker to get access to information that is supposedly in the public domain, that has supposedly been created to assist a variety of users.

Not a week goes by without somebody asking me to give information about my family and me: our taxes; our eating, playing and sleeping habits; how we manage our money; where we shop; what we read; when, where and how we got married; where we went on our honeymoon; how we dress; and asking if we'd like a loan, like to win a sweepstakes and how about a free vacation?

These data seekers reach me by simulated long-distance telephone calls, by mail, by telegrams, on the street, at my doorstep and in my office. Some even try to bribe me to fill out their forms by enclosing a dime or, occasionally, a quarter, insisting that I have a cup of coffee at their expense while filling out the form. But I am often gullible and fill out the forms, hoping that one day I will be a surprise winner of a sweepstakes because of the information I provided.

What happens to the data?

What happens to all the data that is gathered by the various marketing research firms, governmental agencies, associations, political action committees and consumer organizations? In particular, have you ever tried to get information from them? Try it — you will come to admire the skills of our hacking teenagers.

Our government — local, state and federal — gathers all sorts of data on a regular basis. One massive federal effort is the census, which takes place every 10 years. In addition, we spend billions of dollars each year monitoring and measuring our air, water, natural resources, health, social and economic conditions and the productivity of everything and everybody who produces anything. I assume that this data gets stored away in thousands of filing cabinets and computer storage devices. Ours is a highly monitored society.

The problem is that most of this gathered data seems to disappear. Many times I've wished a hacker could come to my rescue when I've sought information. When you request information from an organization, be prepared to hear any of the following responses:

- We only gather and store data, and no money is budgeted for retrieving it.
- Our programmer quit, so why don't you call us back in a few months?
- We had a budget cut, and the system is not maintained anymore.
- We just moved to a new site and haven't unpacked yet.
- Why don't you contact our Washington office?
- You had better ask the boss — and by the way, he's on vacation until next month.
- We lost the data tape.
- The data base is too complicated, and the chances of misuse are quite high, so it's our policy not to release it to outsiders.
- Our people are too busy — we can't free up anybody to comply with your request.
- We haven't put it on the computer yet.
- We haven't decided on the release date yet.
- We are switching to a new system, so why don't you call back in a year?
- We are going to print the data base in the form of a book and make it available through National Technical Information Service. You can buy it from them.
- Contact our central depository.
- If you need it that badly, why didn't you collect the data yourself?
- Make your data request by filling out Forms 5271, 6482 and 7633 in triplicate. You can get these forms by writing to our headquarters' data center. Allow six to eight weeks before contacting us again. No telephone inquiries or in-person visits will be permitted. To avoid any fur-

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VIEWPOINT

We must protect the data others see as threat

READER'S PLATFORM

HARLAN W. CROUSE

Much has been written and spoken about 1984, and with that year now upon us, we can expect even more commentary and predictions. Most of the comments have dealt with George Orwell and his writings. Nearly everything thus far expressed about 1984 has been negative — Big Brother, lack of privacy, world tensions and the problems of technology running rampant.

People have always been suspicious, even afraid, of new ideas and inventions. It seems to be a human characteristic to fear the unknown or that which may change comfortable, accepted circumstances. The negative ideas and threatening scenarios expressed in association with 1984 accentuate the tendency to technology paranoia.

One expression of this fear that we may see is a strong, overt reaction by the ordinary individual to such threats, especially a reaction against what may be perceived as Big Brother and the technologies associated with totalitarian rule. In many minds, computers and data processing fit into this category.

By "ordinary individual" I mean the common man on the street — not hackers, not people with any special knowledge of data processing and not those looking to subvert an automated system for illicit gain. It may be difficult for some to imagine ordinary Americans "rising up" to do anything, but fear and anger can be great motivators.

Increasingly mistrustful

Americans in recent years have become increasingly mistrustful of the government and large corporations. Concern over privacy has never been more intense. Many people still fear that computers and the large amounts of information stored and processed by these machines are primary threats to privacy.

It is quite possible that the near future may bring a rash of attacks on automated information resources — data, hardware, software, storage media and facilities, in fact, anything and everything associated with data processing, not excluding personnel. These attacks could be perpetrated by disgruntled people: those with a reason, real or imagined, for striking back at the perceived invaders of individual privacy and freedom.

These people may attack directly or by proxy. Skilled or enraged persons may attack directly, even physically. Those less skilled or more circumspect may use others to perpetrate their attacks. It is conceivable that a new service industry may be born to procure, alter or destroy information concerning individuals contained in various computer files and data bases. With the dearth of effective computer crime legislation, such activities may not even be illegal.

These attacks may not stop with disaffected persons. Social critics could represent another threat to automated information resources. Incidents similar to the anti-war activities of the late 1960s and the early 1970s may arise as citizens fight a perceived Big Brother. With an ever-increasing amount of government information residing in computerized files, what is the likelihood of an electronic version of *The Pentagon Papers*?

Those of us involved in data processing security walk a fine line. As individuals, we are as much concerned about Big Brother, privacy invasion and the accuracy of information maintained about us as the next person. As professionals, it is

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VIEWPOINT

Are computer vendors getting a fair shake?

READER'S PLATFORM

JOSEPH P. ZAMMIT

It is fashionable these days to portray computer vendors as callous, overreaching and dishonest. To listen to the hyperbole, one would think that computer vendors are the modern equivalents of snake-oil salesmen: telling the most outrageous lies in order to steal a quick buck, then fleeing town just one step ahead of a crowd brandishing tar and feathers.

But does the image comport with reality? More importantly, does the image do an injustice to legitimate vendors when a judicial forum to resolve the claims asserted by dissatisfied customers is available?

No doubt the industry has seen its share of disreputable characters. And computer salesmen, like all salesmen, are not bashful about praising the qualities of their wares. Yet it strains credulity to believe that vendors are guilty of outright fraud and deceit on anything like the scale that is sometimes suggested. It is simply not in the interest of vendors repeatedly to disappoint false expectations that they themselves have created. Most vendors are in business for the long haul, and they can hardly expect to achieve long-term success if they establish a reputation for habitual lying.

Several reasons

Nevertheless, the image persists. Why? I believe there are several reasons. First, despite the increasing frequency with which they are used in everyday commercial life, computers still retain something of the aura of magical black boxes. This perception is often an intellectual cop-out. For one thing, purchasers often fail to define adequately their own needs — something that the vendor cannot do for them. Moreover, it is easier for a potential purchaser to pretend that "this is just too complicated for an ordinary person to understand" than to assume some responsibility for making a decision. If responsibility is abdicated to the "expert" vendor, it is easier to blame the vendor (who should know better) if anything goes wrong.

A second reason for the poor image of vendors is the nature of computers themselves, particularly software. Computer systems are highly complex, frequently sensitive and never completely debugged. Every sale represents, to some extent, an educated guess that the system will be capable of fulfilling the user's needs — particularly if the sale contemplates any custom programming. Purchasers, failing to appreciate this fact of life, are quick to believe that any failure to live up to expectations reflects misrepresentation on the part of the vendor.

Finally, it is in the interests of certain groups — notably, a growing number of plaintiffs' "computer lawyers" — to promote the rather sleazy image of vendors. Recognizing that contracts frequently limit the vendor's liability, these attorneys have sought theories around such contractual limitations.

"Fraud" is the most obvious route. Not only does a fraud claim offer the promise of circumventing restrictive contractual provisions, but it tantalizes with the hope of unlimited punitive damages. Such possibilities have a lot more "sex appeal" to potential clients than the restricted recoveries available under most contracts. A small number of highly publicized decisions has lent credence to the exhortations of plaintiffs' attorneys.

Air of unreality

There is virtually no lawsuit filed against a vendor today that does not include a claim for fraud. Yet the very frequency with which the claim is asserted suggests an air of unreality.

Can it actually be that every time a computer fails to perform in accordance with the user's expectations, it is because the vendor lied? Can it be that there is even a legitimate question of fact whether fraud was committed in all these cases? I think not.

Nevertheless, the very assertion of so many fraud claims works an unfair hardship on vendors, particularly smaller ones.

While courts will often grant vendors summary judgment on breach of contract claims because of clear contractual provisions, they are extremely reluctant to accord similar relief on fraud claims. That means the vendor must undergo the not unsubstantial expense of extensive discovery and a trial. That trial will usually be before a technologically ignorant jury that itself subscribes to the "snake-oil salesman" view of computer vendors — a view often reinforced by one-sided horror stories appearing in the popular press.

Moreover, the evidence of fraud is likely to consist solely of the purchaser testifying that "the salesman told me," to which the vendor can respond only by denying; the jury then is left to choose whom to believe. It frequently believes the purchaser, no

How to avoid the 'snake-oil' salesman image

matter how farfetched his story, precisely because it does not understand how farfetched the story is.

Argument is unconvincing

Some would argue that fraud claims are a necessary and inevitable response to the "unfair" and "one-sided" contracts proffered by vendors that are far more knowledgeable about their products than their customers. The argument, however, is unconvincing.

The law of contracts was developed to permit parties to agree in advance on the rules that would govern their relationship and to allocate between them the risks of that relationship.

Allowing fraud to be used casually by dissatisfied purchasers to avoid contractual provisions unfairly defeats the legitimate expectations of the vendor. Even if the contract is a "standard form," no one has compelled the purchaser to sign. Moreover, given the highly competitive nature of the computer industry, the bargaining power of purchasers is far greater than some would like to believe. There is always the possibility of going to another vendor or paying more for an enhanced warranty. The fact that a purchaser has failed to explore adequately his alternatives should not be charged against the vendor.

Limit application

All of this is not to suggest that genuine instances of fraud do not exist or that when they occur they should not be actionable. Rather, the point is that fraud should be carefully confined to those situations in which it was meant to apply: intentional misrepresentations of material facts reasonably relied upon by the purchaser to his detriment. Courts should not be loathe to dismiss cases in which it is readily apparent that those standards cannot be met or to impose sanctions upon parties and their attorneys who assert fraud claims without sufficient basis.

Unfortunately, given the moderate degree of success achieved to date by the plaintiffs' bar, the trend is likely to be toward ever-increasing computer fraud litigation. Is there anything a vendor can do to protect itself? The answer is yes, although self-help is not an adequate substitute for a change in public and judicial attitudes.

First, vendors can build a certain amount of protection even against fraud claims into their contracts. For example, there is authority supporting the proposition that very specific disclaimers contained in a written agreement will prevent a plaintiff from relying on supposed contrary oral statements.

A general disclaimer of implied warranties or a merger clause is not enough; the disclaimer must specifically negate the existence of the alleged misrepresentation.

Another possibility is to broaden provisions that reduce the normal statute of limitations to include fraud as well as contract claims. Vendors might also want to consider arbitration clauses as a way of avoiding jury trials and punitive damages.

Vendors can also do a better job of policing their literature and sensitizing their sales force. Ambiguous statements in brochures can be avoided. Salesmen can be trained in the art of writing letters and proposals in a fashion that avoids unnecessary embellishment and includes appropriate qualifications. Procedures can be implemented that document what has been stated or promised at meetings with customers.

Finally, vendors can take a tip from the opposition and start choosing counsel who are knowledgeable and experienced in the computer area. For some inexplicable reason, vendors frequently choose attorneys without focusing in at all on the skills necessary to draft procurement contracts properly and to handle complex computer litigation. Firms that are perfectly competent for general corporate work or other types of litigation are not necessarily the appropriate choices for such specialized tasks.

Ultimately, a vendor's best defense is in the quality of its product, the integrity of its personnel and the good faith with which it supports its customers. A little good public relations wouldn't hurt either. But until prevailing attitudes change, vendors will have to factor potential litigation costs into the price of their products. From that perspective, it is ultimately computer users who pay for the poor image of vendors. ‡

Zammit is a New York resident partner, concentrating in DP law, in the New York-Los Angeles-Washington law firm of Reavis & McGrath.

GUNS from page 62

ther delay, provide all the data requested in these forms. Send your request with a cover letter on your company's stationery with an endorsement by your company's president. This is a recording.

Of course, not all data bases are inaccessible to the same degree. Some are created with users in mind, and there are conscientious people in every organization who will go to great lengths to help you get the information you need as quickly as possible.

We users are thankful for these few concerned individuals. Without them, I suspect hackers would be hired regularly. On the other hand, there are people in many organizations who understand that information is power. They will go out of their way to stifle and limit users' access to information.

I believe that data collection programs should be coupled with the objective of providing those who need to make decisions with information that is timely, relevant and useful. If information is withheld or unused for some reason, then we can make decisions only on the basis of experience or judgment.

Every manager who is being urged to invest large sums of money to gather data should not commit the error of relegating this decision completely to technical professionals. These professionals have many redeeming qualities, but providing data to users in an efficient way is not one of them. It is commonly but erroneously assumed that managers and policymakers should not meddle with the design, development and operation of data collection programs — that such details should be developed by the technical professionals.

But these assumptions have caused American organizations considerable losses in terms of unused information. Managers should find out how the information system is supposed to help users like themselves and then hire a hacker or two to make that information available.

Governor's advisory

A Midwestern governor's advisory commission recently stated that there is a great need today to improve the kinds of decisions, both public and private, being made about resources. The decision makers need to have more ready access to accurate data on water quality and quantity, natural resources, soil, land use and pertinent geological features.

The commission further noted that much of the information is already available in a variety of forms and places, but it is not accessible to the public and its decision makers in a usable way. Perhaps the commissioners should hire a hacker.

Systems that provide useful information do not just come into existence. They must be planned, designed, developed, evaluated and modified with the active participation of users at every stage. Otherwise, hackers will become the hired guns of the high-tech age. ‡

Rajagopal is an associate professor in the geography department at the University of Iowa, Iowa City.

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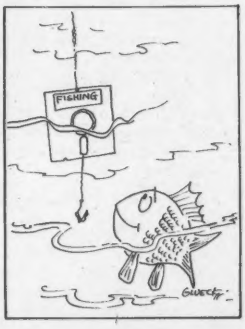
our job to protect those same resources that are seen by so many as a leading threat. To be effective, the security professional must recognize the adversities faced, advise employers and devise means of reducing vulnerabilities.

Let us all hope 1984 brings us neither Big Brother nor overreaction to a perception of such. However, data processing managers and security professionals must do more than hope; we must act, and we must act now. ‡

Crouse is systems security officer of automated DP at the Department of the Army, Fort Leavenworth, Kan.



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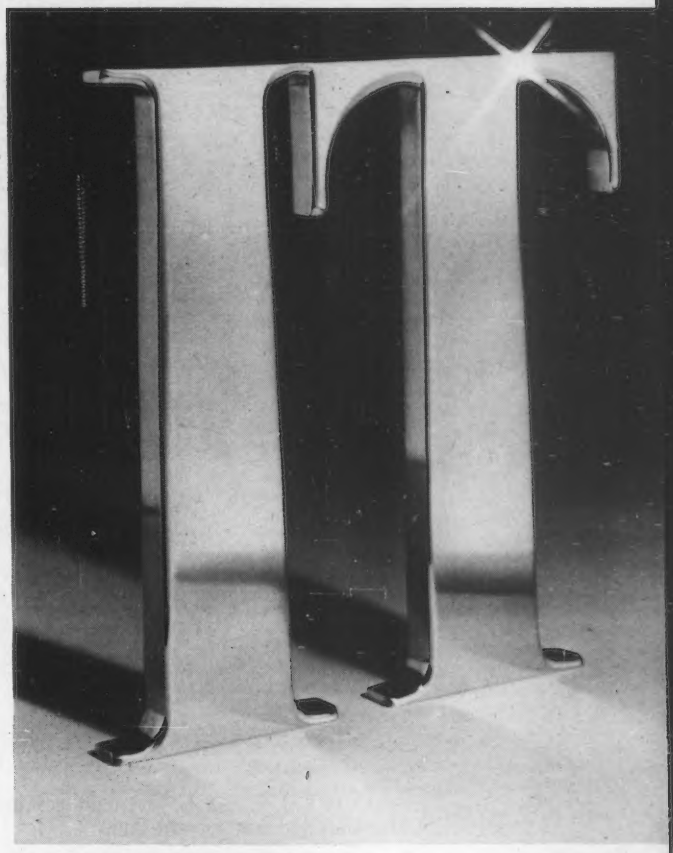

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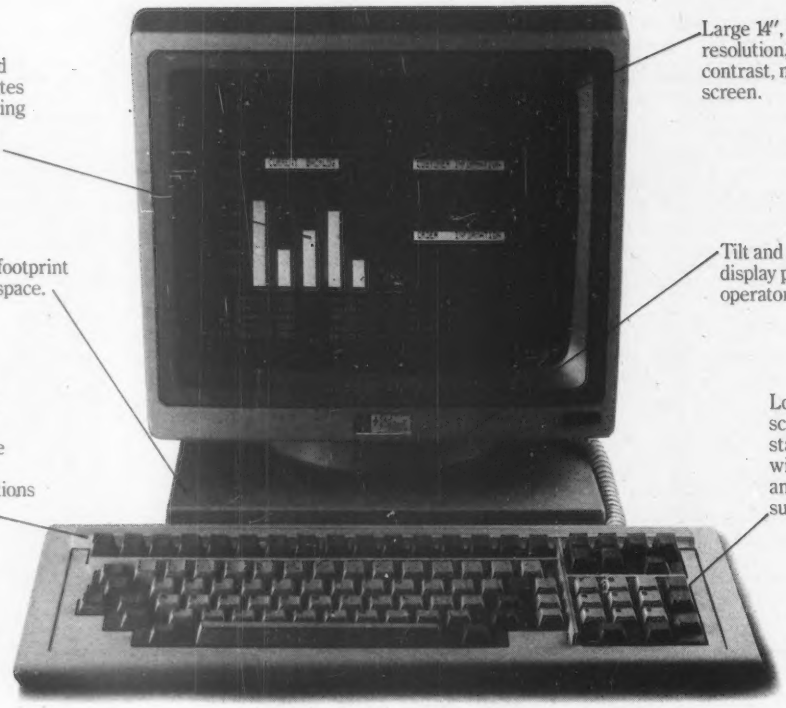

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SOFTWARE & SERVICES

Two DBMS types seen emerging

SOFTLINE

WILLIAM INMON

It seems that an evolution is occurring in data bases in the mid-1980s. In the large mainframe environment, the most complete embodiment of the original notion of data base was the "full-function" data base management system (DBMS). This is one that fulfilled the original goals of the data base while interfacing with or containing a teleprocessing monitor and interfacing with a standard operating system. It also handled a wide range of application functions and could handle both small and very large amounts of data. The standard for the full-function DBMS was IBM's IMS.

But there are signs that the DBMS is evolving from a full-function DBMS toward two types of DBMS — a high-performance DBMS and a decision support DBMS (Figure 1). The evolution is shaped by the realization that high-performance DBMS do not make a good foundation for MIS and that decision support systems do not make a good foundation for operational systems.

One trait of a high-performance DBMS is the very high arrival rate of on-line transactions that can be sustained. In a full-function DBMS, a sustained arrival rate of 20 transactions per second is very good. But in looking at future needs, it is not inconceivable to think in terms of 200 transactions per second.

Another trait of high-performance DBMS is the ability to manage very large amounts of data. The data bases kept by credit bureaus, insurance companies and government agencies fit into this category.

A third criterion for high-performance systems is on-line update data integrity. The on-line update of transactions must remain pure, that is, not interfered with by other on-line transactions acting on the same data at the same time. High-performance systems are optimized

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DBMS puts rail firm on track

Relieves MIS of application burden

CHICAGO — Besieged by requests for applications, the MIS department at Trailer Train, a major supplier of intermodal cars to the railroad industry, got back on track with fourth-generation information management technology.

Trailer Train has transferred much of the information processing function from MIS to end users. It has closed the loop with Focus, a nonprocedural data base management system and high-level language from Information Builders, Inc.

Trailer Train's information center has trained over 120 users within a year. Focus applications, accessing files ranging from 2,000 to 100,000 records, have been developed for an IBM MVS/TSO environment running on an IBM 3083 mainframe. "Wherever we can use Focus, we use it," Chuck Malone, manager of MIS, said. "It's much easier and a lot faster than writing a Cobol report program. If you've got to change your program, Focus makes it a lot easier to maintain."

Within the MIS department, Focus is used as part of a project management system tracking all information center requests, users and procedures for administrative reporting and resource management. The system is also used for outlining all productivity improvements developed within the company that replaced manual systems.

"It's easier for me to learn DP than it is for MIS to learn railroad distribution," Bob Caldwell, fleet distributor supervisor, said. "Besides, it might have taken months for the MIS department to develop my resource management program. With Focus, I developed a system that allocates 27,000-plus cars equally among the 10 major railroads by average car cost [and that also tracks] surplus and shortages in order to distribute cars where they are needed in the shortest amount of time. And I did it myself in two weeks."

In addition to leasing flatcars, gondolas and boxcars, Trailer Train spends about $100 million annually on shop maintenance for its cars and about $100 million more on repairs performed by railroads on Trailer Train cars while in service. Trailer Train runs three active maintenance facilities along with a regional distribution center for repair parts.

Pointing out that the maintenance expense is the single largest controllable expense Trailer Train has, Larry Greenfield, director of maintenance planning, estimat-

See **FOCUS** page 72

Denelcor unleashes HEP/UPX

AURORA, Colo. — Denelcor, Inc. has announced a Unix-based operating system called HEP/UPX for its HEP 1000 series of supercomputers.

According to a spokesman, HEP/UPX incorporates the file system from the University of California at Berkeley's Unix Release 4.2.

The file system is said to facilitate file transfers from most Unix-based workstations, minicomputers and superminicomputers. The vendor spokesman also said the operating system's performance in both time-sharing and real-time applications is significantly higher than Denelcor's HEP/OS operating system, which it replaces.

Denelcor also announced C and Fortran 77 language compilers for the HEP/UPX operating system. The compilers share a common code generator and an optional global optimizer for improved runtime performance, the spokesman said.

According to the vendor, extensions to both languages allow them to take advantage of the HEP 1000 architectural features of parallel execution and variable synchronization.

A source code license for HEP/UPX is priced at $15,000, which includes the C compiler.

The source code license for the Fortran 77 compiler is priced at $7,500, the vendor said.

Denelcor can be reached through P.O. Box 31500, Aurora, Colo. 80041.

IBM

IBM mainframes get data set and catalog management system/**72**

INSIDE

Systems Software/**72**
Productivity Aids/**80**
Application Packages/**84**
DBMS/**90**
Remote Computing Services/**90**
On-Line Data Bases/**90**

Apollo recognizes the fact that there are two sides to every professional.

There's a part of a professional that involves their profession.

Then there's the part that goes to meetings, makes presentations, does budget, prepares documents.

According to recent reports, people who work with computers spend some 30% of their day working in their chosen profession. And 70% of their day just getting things done.

So we're announcing some ways for making better use of both sides of their day.

For starters, we've set some new standards in high performance workstations. By introducing a new set of Apollo computational nodes so fast you don't have to wait for them to figure out anything. Even when you're working on Solids Modeling, Image Analysis, Finite Element Analysis, and VLSI Design.

The Apollo DN 660 and DN 460.

Inside you'll find up to 4 MB of main memory with full 32-bit architecture and an integrated hardware floating point unit. And enough power to handle up to 24 concurrent processes, each with up to 256 MB of virtual address space. Plus high resolution bit map graphics that among other things, can do area fills at up to 320 million bits per second.

In other words, they've got all the power of a high performance supermini like the VAX 11/780*. Except that they sit at a desk. And go for a fourth of the price.

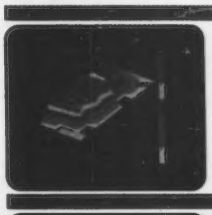
The power of a high-end 32-bit supermini at your desk for a fraction of the price.

But even more important, each DN 660 and 460 workstation node you add to the Apollo DOMAIN network adds power instead of taking it away. Because each is a 32-bit workstation with network wide virtual memory that lets all Apollo nodes share data, software, programs, and peripherals transparently across the network.

But we've also introduced software that helps professionals work with the other side of their work: DOMAIN Professional Support Services. With Document, Mail, Calc, Calendar and File. All based on the more complex needs of the professional. And fully integrated with your application programs. So you can do all your work on the same system.

All of which should come as a very welcome development to every professional. Because we at Apollo are not simply making computers. We're making workstations that work for professionals.

For more information call or write Marketing Services Director, Dept. J1, Apollo Computer, 15 Elizabeth Drive, Chelmsford, Massachusetts 01824 (617) 256-6600, ext. 6608.



The DN 660 and DN 460 can do state-of-the-art Finite Element Analysis at state-of-the-art speed.

They work on documents the way professionals work.

They do Electronic Mail, Filing and Calendar Management.

apollo

*VAX 11/780 is a trademark of Digital Equipment Corporation.

FOCUS from page 69

ed his department saved $20 million with the help of Focus. "Focus has allowed us to compile 10 years' worth of data covering 100,000 cars, repairs and mileage records. We were able to identify high-cost cars and change our maintenance strategy," he said. "By zeroing in on critical areas, we perform maintenance more frequently, but do less extensive repairs."

Focus programs have been developed that break down by car type and mileage level in order to schedule preventative maintenance; track repetitive repairs to pinpoint which cars to bring in and when; identify which items to fix; and forecast component life. A maintenance plan has been developed that projects mileage 10 years into the future, forecasting the level of maintenance expected as well as the dollars that will be spent. A "most wanted list" has been developed that identifies Trailer Train cars experiencing repetitive repairs and pinpoints the reasons for the defects.

Greenfield pointed out that an ongoing cost of $10 million a year incurred by continually replacing wheels was brought under control by information made available from Focus programs isolating the nature and location of the problem. "Focus opened up a lot of possibilities that we just cringed at before because of the amount of data involved," he said.

"The people in my organization use Focus to extract reports that are not available in a purchasing and materials system in a traditional data base management system such as we have," said Peter Stoyanoff, director of material management. "Normally, it could take months for people to get a report. But now they can get a report the same day."

In the materials area, Focus is used to track the status of defective material returned to suppliers, track the availability of reconditioned material and track scrapped cars and repair histories. In addition, a network has been established between the three major maintenance facilities in California, South Carolina and Florida and corporate headquarters in Chicago for accessing centrally maintained material information. "Key information needed in the shops, such as parts forecasting schedules and inventory reports, is now printed and updated on remote terminals," Stoyanoff said. "It used to run in our corporate Chicago office and had to be mailed to the shops. Now the shops can get it overnight."

"Instead of users requesting numerous changes to the current reports they receive from MIS, they can easily create new reports in Focus with existing data and make ad hoc requests," said Mike Saeger, project leader of the information center. "With Focus you can define multipath structures, enabling the users to request reports in just about any format they want."

Astute release said to provide data set control

Astco has announced Release 2.2 of Astute, its data set and catalog management system for IBM MVS and OS/VS1 users.

The main element of this release is the Personal Data Set Manager function, which is said to allow users control of their data sets by providing an interactive handle on all other Astute functions.

Individual data sets may be selected and scratched, renamed, cataloged or browsed. An IBM Interactive System Productivity Facility (ISPF) interface is provided that allows execution of ISPF browse and edit functions on any selected data set and also allows any C list or program to be invoked, the company said.

Also included is a C list interface that provides for interaction between Astute and C lists running under ISPF. Commands may be passed to Astute via C list variables; Astute may be directed to store extracted information in C list variables; and any C list may be invoked as an exit.

Astute is priced at $7,000 for the first CPU; multi-CPU and multisite discounts are available. A site license is also available.

Astco, 926 Amarillo Ave., Palo Alto, Calif. 94303.

SYSTEMS SOFTWARE

AMALGAMATED SOFTWARE OF NORTH AMERICA, INC.
Price change for Acceler8

Amalgamated Software of North America, Inc. plans to discontinue discounts to volume purchasers of Acceler8, a utility for the IBM System/34.

After March 31, volume purchasers will pay $3,300 for the utility, which is said to speed random index processing significantly. Users can rent the utility for $150/mo.

Amalgamated Software of North America, P.O Box 1068, Malibu, Calif. 90265.

DUQUESNE SYSTEMS, INC.
Catalog Performance Optimizer

Duquesne Systems, Inc. has announced its Catalog Performance Optimizer (CPO), designed to improve throughput and response time in IBM MVS systems.

Continued on page 74

MCBA is looking for some professional bill collectors.

More specifically, we're looking for some dealers who like money. Lots of it. Because when you carry our powerful, field-proven software, that's exactly what you can expect.

Why? It's quite simple, really. The quality of MCBA's library of 17 modular manufacturing, distribution, and accounting packages is attested to by over 15,000 users worldwide. In fact, it's really the only serious software of its kind available for mini and micro environments. Thanks to its modularity and flexibility, not to mention its comprehensive documentation. All of which has helped us develop and maintain successful relationships with dealers like you for over 10 years now.

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So if you're a dealer who's in it for the money, call MCBA now at (818) 957-2900. You may not end up being famous. But you could end up rich.

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For HP, Wang, DEC, and TI minis and UNIX, and RM/COS-based micros.

SOFTWARE & SERVICES

Continued from page 72

CPO intercepts catalog management calls and maintains a list of control-volume entries, the vendor said.

According to the vendor, CPO reduces I/O and CPU overhead required for master catalog searches.

CPO runs on MVS and MVS/XA on IBM 30 series and 370 mainframes, the vendor said.

The product is priced at $7,500, with an introductory price of $5,000 in effect until May 31.

Duquesne Systems, 2 Allegheny Center, Pittsburgh, Pa. 15212.

SPECIALIZED SYSTEMS CONSULTANTS
Unix Command Summary; VI Reference

Specialized Systems Consultants (SSC) has announced two additions to its packet of references for users of the Unix operating system.

The Unix Command Summary includes the commands covered in the Unix Users Manual for Release III and provides examples of common commands and shell references. It costs $6.

The VI Reference, is a reference of commands and options for University of California at Berkeley's Visual Editor. It costs $2.50

SSC, P.O. Box 7, Seattle, Wash. 98125.

NITTANY SYSTEMS, INC.
Westicon

Nittany Systems, Inc. has announced Westicon, a program that converts Westinghouse Electric Corp. Westi terminals into IBM CICS terminals.

The software allows the user to run programs written for Westi under CICS without rewriting the application program or running two monitors concurrently, according to the vendor.

The package costs $15,000 for a perpetual license; an optional annual maintenance fee lists for 10% of the cost.

Nittany Systems, P.O. Box 452, Boalsburg, Pa. 16827.

PROGRAM ACCOUNTABILITY & EVALUATION, INC.
Tuner/38

Program Accountability & Evaluation, Inc. has introduced a performance tuner utility program for the IBM System/38.

Tuner/38 addresses such problems as excessive access paths, large subfiles and unstructured high-level language programs. Features include ability to adjust pool sizes and activity levels gradually and allocate core to the subsystem pools that need it the most.

Tuner/38 is available from the vendor for $650.

Program Accountability & Evaluation, 7 Riverway Road, Salem, Mass. 01970.

BRADMARK COMPUTER SYSTEMS, INC.
Dbcopy II modules

Bradmark Computer Systems, Inc. announced that users can buy individual modules, rather than a complete system, for Dbcopy II, a data base utility for the Hewlett-Packard Co. HP 3000 minicomputer.

Dbcopy II features data set purging, data set rebuilding, detail chain integrity testing and dynamic broken chain restoration. It can reportedly restore a data base or a data base subset from a store or sysdump.

Dbcopy II consists of three utility modules: capacity change, which costs $1,000; complete structural features, priced at $2,500; and standard copying feature, available for $2,000. The complete package is available for $3,500.

Bradmark Computer Systems, 4446 Main St., Buffalo, N.Y. 14226.

ADVANCED SYSTEMS CONCEPTS, INC.
Vaxwatch

Advanced Systems Concepts, Inc. has announced Vaxwatch for Digital Equipment Corp.'s VAX-11 computers.

Vaxwatch is said to allow a user to inspect or modify any terminal session under DEC's VMS operating system. The program will connect into the I/O streams of the "watched" terminal and then log all output into a disk file or another terminal.

Vaxwatch can also be made to observe the terminal from which it was started. If the console is placed in "watch" mode, a listing of all systems events can be captured.

The program can be made to observe a terminal session and dynamically log events to disk on command without interrupting the current process.

Vaxwatch runs under VMS version 3.0 or later and is priced at $495.

Advanced Systems Concepts, 22 Hudson Place, Hoboken, N.J. 07030.

GREENE SOFTWARE
Queue/34

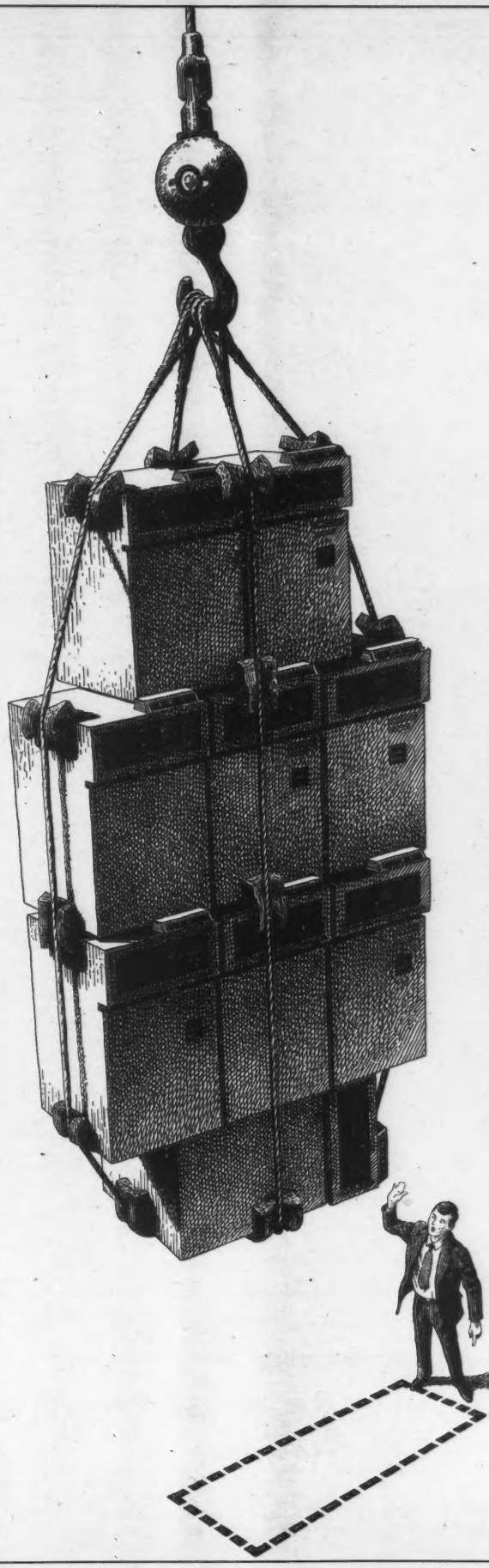
Greene Software has announced Queue/34, which the vendor described as a productivity tool for the IBM System/34.

Queue/34 is said to establish an auxiliary batch job queue that allows user jobs to run independently of and concurrently with jobs in the System/34 job queue. The utility reportedly improves utilization of system resources and increases total throughput of the System/34.

The product also includes a set of Help screens. Users reportedly have control of their jobs' positions in the queues, status, start time, execution priority and completion messages through interactive screens. Queue/34 is available for a one-time license fee of $295/CPU.

Greene Software, P.O. Box 23, Victor, N.Y. 14564.

See SOFT page 79



How to put 640 square feet of computer disk storage in a 7′ x 3′ space.

There's no way to store that much data in that little space if you're using disk drives. Even 3380 class. But Masstor Systems' M860 Mass Storage System – a different kind of data storage technology – can solve the problem.

The entry-level M860 stores 55 billion bytes of data on-line and can be expanded to 440 billion bytes. At one-quarter the cost of disk. And less than 4% of the floor space. It also automates tape operations, making processing much faster and more economical.

The M860 is a third storage alternative for your IBM and other plug compatible mainframes. One that offers more on-line storage capacity for your new applications and requires no conversion of your existing programs. Masstor has an M860 solution for Sperry, Honeywell, DEC/VAX and CDC mainframes, too. As well as a way to hook them together in a network: MASSNET.

The M860 and MASSNET are two of a family of Masstor Systems' strategic products that allow you to move, store and share data efficiently and economically.

To find out more, contact Dave Ball at Masstor Systems Corporation, 5200 Great America Parkway, Santa Clara, California 95050. (408) 988-1008. And cut your data storage problems down to size.

MASSTOR SYSTEMS

Strategic solutions to moving, storing and sharing data.

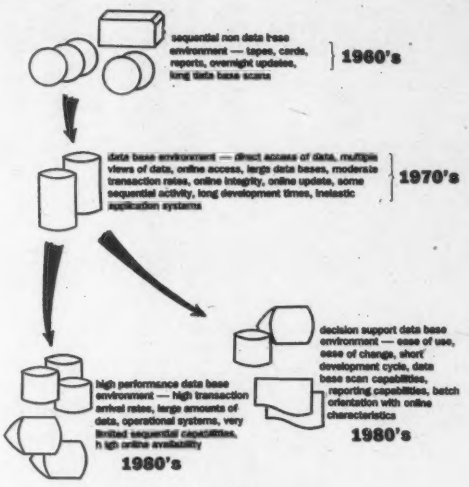


Fig I

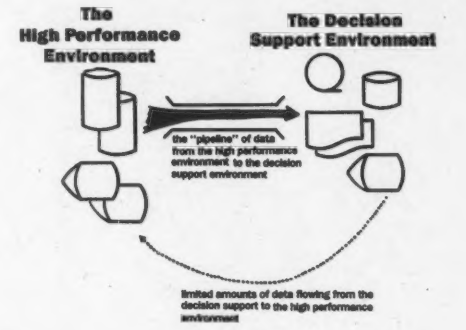


Fig II

DBMS from page 69

to operate on the units of data (segments, records and the like) of a data base rather than on the entire data base. The primary thrust is toward on-line systems, with fast, limited access of data.

Mixing the three criteria is quite challenging. The result is a system that is useful for operational control of a company. Not surprisingly, the high-performance DBMS environment is quite complex. Reading between the lines of IBM's announcements of IMS Fast Path (for IMS 1.3) would indicate that IBM intends to fill the future needs for high- performance software with Fast Path.

The decision support environment is optimized to manipulate entire data bases in a single request and, to a lesser extent, the units of data within the data base.

The first-quarter 1984 enhancements of Fast Path extend the capabilities of the previous version significantly. The migration from IMS Full Function to Fast Path is an evolutionary one, not a revolutionary one.

While high-performance DBMS have many operational capabilities, in general they must be used very carefully as they are difficult to change. What is springing up in the void are decision support data base software packages that serve a different audience. Decision support software is easy to change and easy to use in developing new systems.

This software is especially appropriate for unstable environments where the basic form of data is subject to constant and unpredictable change. The difficulties with the long development cycles that are common to high-performance systems are not the same in the decision support environment.

The decision support environment is optimized to manipulate entire data bases in a single request and, to a lesser extent, the units of data within the data base. While there are certain on-line characteristics of decision support software, most of it is designed to operate in a batch or sequential mode.

In environments where there is more than a moderate amount of activity and/or where there are large amounts of data, the activities are restricted to limited queries of data. The full range of decision support activities such as updates, large scans of data and other activities requiring many resources are batched and run at night in a sequential mode. Decision support software is typified by IBM's recently announced relational software.

The route from IMS Full Function to relational is made easy by common

See **DBMS** page 78

AT THE FOREFRONT OF THE REVOLUTION IS THE MULTIFUNCTION WORKSTATION.

Seven years ago, DATAPOINT ignited a revolution in business communications with the introduction of ARC (Attached Resource Computer), the original local area network. Today the ARC local area network is the most thoroughly proven system of its kind, bringing distributed processing and desktop computing to businesses around the world. The 8600 multifunction workstation is a vital part of that success, leading the continuing revolution in communications, software, processing power, and ease of operation.

The DATAPOINT 8600 high-performance processor features data processing, word processing, data communications, business applications software, and system operations in one compact unit. It can communicate with your existing mainframes as well as with other DATAPOINT equipment. When attached to an ARC local area network, it becomes the basis of a system that can expand as far and as fast as your business expands.

If your company wants to join the revolution, talk to our worldwide sales and service force about the 8600. It could put a spark of the revolution in your office.

THE DATAPOINT 8600.

Call 1-800-334-1122 toll-free for a demonstration.
Or send this coupon to: DATAPOINT Corporation,
9725 Datapoint Drive, T-47, San Antonio, Texas 78284

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Company _____

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City _____ State _____ Zip _____

Telephone (_____) _____

DATAPOINT

We sparked the revolution.

DBMS from page 76

calls and by extract and load facilities. Like the migration to Fast Path, the path to IBM's relational system is evolutionary.

If the very definition of data base is splitting into two directions, what does that portend for existing IMS Full Function applications? By virtue of the fact that there are literally billions of dollars of full-function applications in existence today, there is a momentum that will not easily change.

Vendor support

What will happen is that as full-function applications reach the end of their life cycle, there will be encouragement by vendors to rebuild the applications in modes other than full function.

High-performance and decision support software will almost certainly not share the same mainframes. If there is a sharing of these resources, it will most likely be on a "duplexed" basis, where the systems run during certain hours of the day in one mode and at other times in another mode. The basic operating characteristics of the systems are such that they are mutually exclusive.

High-performance and decision support systems will share data by means of a "pipeline" connecting them. Entire data bases or large masses of activities will flow from the high-performance environment on a periodic basis.

Reverse data flow

Limited amounts of data will flow in the reverse direction and under stringent conditions. The reverse flow of data will enter the high-performance environment through the sequential capabilities of the high-performance environment as seen in Figure 2 on page 76.

The two types of DBMS operate in essentially different modes, and there will necessarily be wholesale duplication of data between the modes. Within the same mode of operation, there will be an absolute minimum of data duplication.

The direction of other vendors toward the multiple DBMS environment is not as clear as IBM's. The advertisements indicate that the direction is toward both high-performance and decision support at the same time. If that is the case, then Cullinet Software, Inc.'s IDMS appears to be heading for the old idea of a full-function DBMS being all things to all people.

Other DBMS vendors seem to have a more directed pursuit of their niches in the marketplace. These include Computer Corp. of America's Model 204, Mathematica Product Group, Inc.'s Ramis, Information Builders, Inc.'s Focus and others.

'There is a momentum that will not easily change. . . . What will happen is that as full-function applications reach the end of their life cycle, there will be encouragement by vendors to rebuild the applications in modes other than full function.'

Those companies with a clear vision of where their role lies in the mainstream of evolution will prosper, whereas those without a clear understanding of the forces of evolution will wither.

Inmon is a director at Coopers & Lybrand in Denver, an author on the subject of data base design and a regular contributor to Softline.

'Whether the system comes in any other color than beige is not a technical question.'

SOFT from page 74

VIRTUAL MICROSYSTEMS, INC.
HP Bridge

Virtual Microsystems, Inc. has announced HP Bridge, a board that allows Hewlett-Packard Co. HP 3000 superminicomputers to run Digital Research, Inc.'s CP/M operating system.

The bridge includes a Zilog, Inc. Z80 microprocessor, software utilities for translating data and a license for CP/M, according to a spokesman for the vendor. With the bridge, any HP 3000 terminal acts like a dedicated microcomputer, the spokesman said.

The board and system software to run the board cost $5,000 each.

Virtual Microsystems, Suite 720, 2150 Shattuck Ave., Berkeley, Calif. 94704.

DYLAKOR
Dyl-Security

Dylakor has announced Dyl-Security, said to be a high-speed, re-entrant implementation of the National Bureau of Standards Data Encryption Standard algorithm.

According to the vendor, the system handles most encryption needs with three coding modes and two short block padding modes. It can be invoked with a call verb or its equivalent, and vendor test results indicate that Dyl-Security can encrypt over 90K byte/sec on the IBM Model 3033 processor.

Dyl-Security contains two assembly language modules: encryption and decryption. They can be called in a Cobol or assembler program, or in Dylakor's host languages — DYL-260, DYL-270 and DYL-280.

Dyl-Security is available for IBM's OS, DOS and SSX operating systems on IBM Models 360 and 370, the 30 series, the 4300 series and plug-compatible mainframes. It is priced at $1,000, plus optional maintenance.

Dylakor, 17418 Chatsworth St., P.O. Box 3010, Granada Hills, Calif. 91344.

SIGNAL TECHNOLOGY, INC.
Resource accounting system

Signal Technology, Inc. has announced that its project-based resource accounting system for Digital Equipment Corp. VAX-11 computers can be purchased separately. Previously, the software package could be purchased only in conjunction with the vendor's Process Accounting and Chargeback system software.

The software package reportedly provides three reporting levels for account name, user name and project name. The same user name can be used for multiple projects, and each project name/user name combination can have its own default directory, a spokesman said.

The package ranges in price from $1,000 to $2,200.

Signal Technology, 5951 Encina Road, Goleta, Calif. 93117.

BUSINESS SUPPORT SYSTEMS, INC.
Columnizer

Business Support Systems, Inc. has introduced a software chart program said to simplify the inputting and editing of multicolumn documents on Wang Laboratories, Inc.'s OIS system.

According to the vendor, Columnizer enhances Wang word processing software by eliminating word wrap-around when working with multicolumn applications.

The program features automatic generation of vertical and horizontal lines, the ability to move columns vertically and horizontally, support of up to 15 columns of data, support of columns and row headings and the ability to save specifications for repetitive applications.

Continued on page 80

SOFTWARE & SERVICES

Continued from page 79

A permanent license costs $495 for the OIS Master CPU and $1,200 for Wang's Wise Network of four or more CPUs.

Business Support Systems, Suite 102, Executive Place V, 60 Mall Road, Burlington, Mass. 01803.

LOGISTIKOS, INC.
Menu Facility

Logistikos, Inc. has announced Menu Facility, an interactive, menu utility for the IBM System/38 minicomputer.

The menu format allows users to display 96 items in single- or double-col. format, the vendor said. Security features reportedly include password assignment to any menu or menu item, time restriction for certain menu items, tracing of any item and automatic logoff for unused terminals.

Menu Facility costs $495.

Logistikos, Suite 920, One Michigan Ave., Lansing, Mich. 48933.

RD LABS, INC.
RD/Share Release 2.0

RD Labs, Inc. has announced a release of its RD/Share program library management system for the IBM VM/CMS environment.

RD/Share Release 2.0 is said to manage the CMS update facilities allowing for maintenance of multiple levels of change files and effective version control. Enhancements reportedly include improved management reports and an on-line Help facility, support for IBM OS, DOS and CMS targeted compilations, compressed file support and improved documentation.

RD/Share Release 2.0 is priced at $5,475 for a permanent license and $455/mo for lease. It also is available on a rental plan.

RD Labs, P.O. Box 25582, 1779 Tribute Road K-1, Sacramento, Calif. 95865.

SOFTWARE TECHNIQUES, INC.
UTL

Software Techniques, Inc. has announced UTL, a multifunction system utility for processors running under Digital Equipment Corp.'s RSTS/E operating system.

UTL provides on-line control of system operation, replacing seven utilities with one program to save processing time and system memory. UTL incorporates the RSTS/E functions of Utility, Ttyset, Systat, React, ATPK, Umount and Shutup.

The UTL system is priced at $350.

Software Techniques, 5242 Katella Ave., Los Alamitos, Calif. 90720.

SDI
Universal File Portability

SDI has introduced Universal File Portability (UFP), a product which allows interchangeability of storage media with no program changes, recompilation or relink required.

As an introductory offer, UFP is available to SDI software users free of charge and to new customers at a cost of $90/mo on a two-year basis.

SDI, 1700 S. El Camino Real, San Mateo, Calif. 94402.

PRODUCTIVITY AIDS

XXCAL, INC.
XXCalibration

XXCal, Inc. has announced a software testing and evaluation service designed to identify software bugs and suggest improvements before marketing.

With XXCalibration, software authors can test programs for as long as several days and receive a third-party report on technical shortcomings — such as programming and documentation errors — and on nontechnical concerns like ergonomics.

Prices are determined by the complexity of the program, beginning at $30 per man-hour for general-purpose word processing software.

XXCal, Suite 114, 2001 S. Barrington Ave., Los Angeles, Calif. 90025.

See AIDS page 84

What three letters represent the most powerful on-line computer in business today?

TX

The most powerful on-line

Time was, the answer to the previous page was as easy as ABC.

But that was yesterday.

Today, the world of business computing is being introduced to a system featuring over two-and-a-half times the performance and twice the price/performance of its nearest competitor.

A versatile system. Able to compile the information of the largest corporations into a single relational data base. Instantaneously updated and fully available across the entire system.

An expandable and compatible system. Allowing the simple addition of future programs and equipment, without sacrificing past investments.

And most importantly, a system that won't let you down. Because its fault-tolerant design won't let itself down. Even if a major component fails.

This system isn't from IBM.

It's from Tandem.

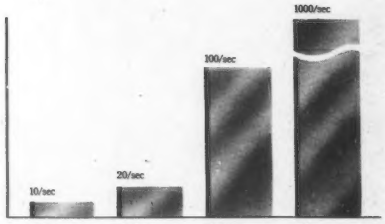
Introducing the NonStop TXP™ system.

TXP: 32-bit transaction processing.

The TXP system processes high volume loads faster and more economically than any other system. Executing over 100 transactions per second now and thousands of transactions in the near future.

It's built around multiple parallel 32-bit processors. Each addressing 16 MB of physical memory and over a gigabyte of virtual memory.

To help memory keep pace with that kind of processing, TXP pulls 64 bits on each memory access.



Our success can be summed up in a second. *Transactions per second. Numbers unsurpassed in the industry. On-line systems that fit your needs today. And tomorrow. With more processing power on the way.*

The TXP system also features parallel data paths. Manipulating 32 bits of information in a single cycle, two 16-bit operations in the same cycle.

And TXP incorporates extensive pipelining, to process multiple instructions simultaneously. Each processor overlaps instructions in three levels: Fetching one, while preprocessing a second, while executing a third.

While helping TXP deliver full 32-bit power, for less.

Cache memory pays off in faster response times.

Cache memory is a high-speed data storage area between the processor and main memory. It lets the processor store more frequently used information closer. So it can get to it faster.

And our tests have shown that the TXP cache memory has a 98% "hit rate." Which means the requested data is virtually always nearby for fast access.

The result? Larger volumes of work can be processed in shorter amounts of time. Helping TXP to be even more productive.

Making cache memory pay big dividends.

A system you'll expand, not disband.

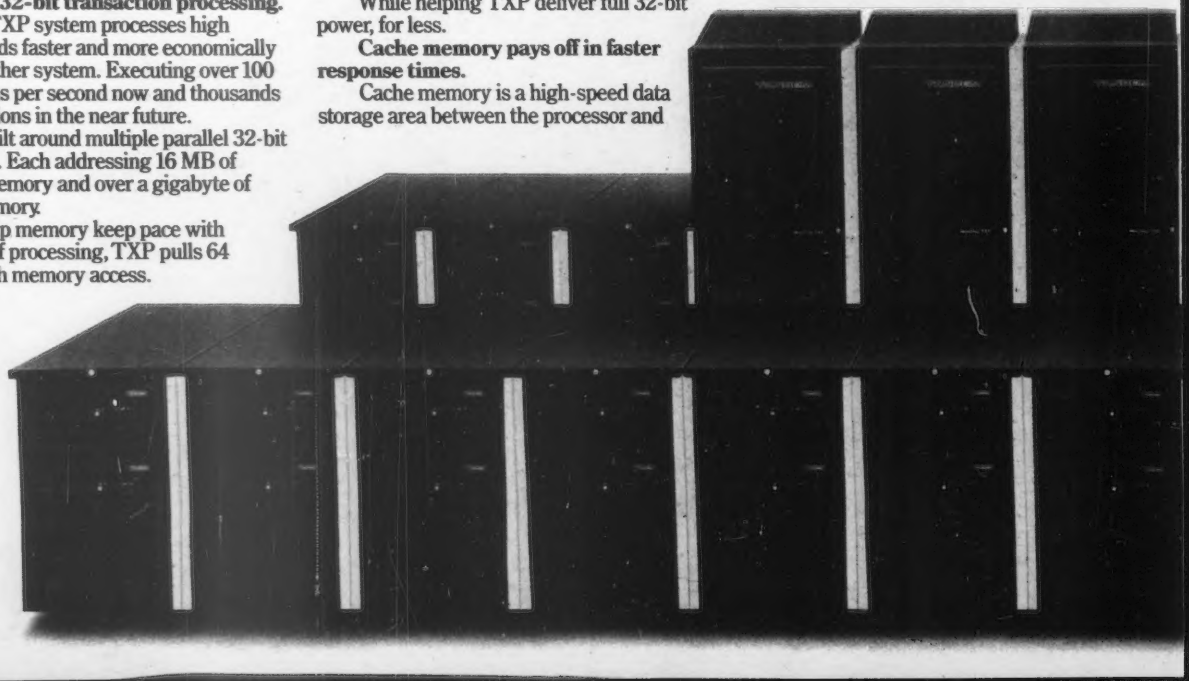
Most computer systems have very limited expandability. So if a company outgrows its computer's capacity, it usually means starting again from scratch.

Selecting and buying a larger and more expensive system.

Then reprogramming.

Then re-training.

Plus all the chaotic disruption and



XP

computer in business today.

massive loss of revenue that's unavoidable during the switch-over.

Not so with the TXP system.

It can expand from two to 16 processors. Increasing its power by a factor of eight.

That's more power than any of the largest mainframes.

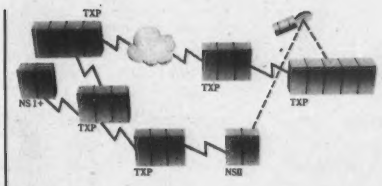
And the additional processors can be installed while TXP is running at full speed. No downtime. No reprogramming.

Still not enough power? Up to 14 TXP systems can be joined together by high-speed fiber optics. Linking the systems together as one computer with 224 processors.

But that still isn't the full potential of the TXP.

TXP systems at up to 255 sites can be joined in a worldwide network. Generating the power of over 4,000 processors.

And that gives TXP the most powerful on-line computer capacity in business.



The most powerful computer network in business today.
Users access a single unified global data base from any of thousands of terminals anywhere in the system.

Expandability our competition wishes they could disband.

NonStop™ system compatibility from the people who started it all.

TXP can process more information and support more programs, users and devices than any other computer designed for on-line transaction processing.

Devices you most likely already have. Even devices made by IBM.

But what if your company isn't quite ready for the TXP system's awesome power?

We suggest the Tandem NonStop II™ system. The second most powerful on-line computer in business today. The cost effective solution for medium to large corporations.

What if your company is somewhere between a Nonstop II and a TXP?

No problem. They can be combined. They can share the same data and programs. In fact, NonStop II and TXP processors can coexist in the same cabinets.

And what if your company needs even a smaller computer? We make a smaller computer. The Tandem NonStop 1+ system. Perfect for those low-volume sites where less processing power is needed.

Tandem literally wrote the book on NonStop™ transaction processing. That's because we introduced the first NonStop system.

Over eight years ago.

And for over eight straight years, despite attempts by others, we've continued to lead the industry.

Learn all about TXP, ASAP.

For complete literature, contact your local Tandem Sales Office.

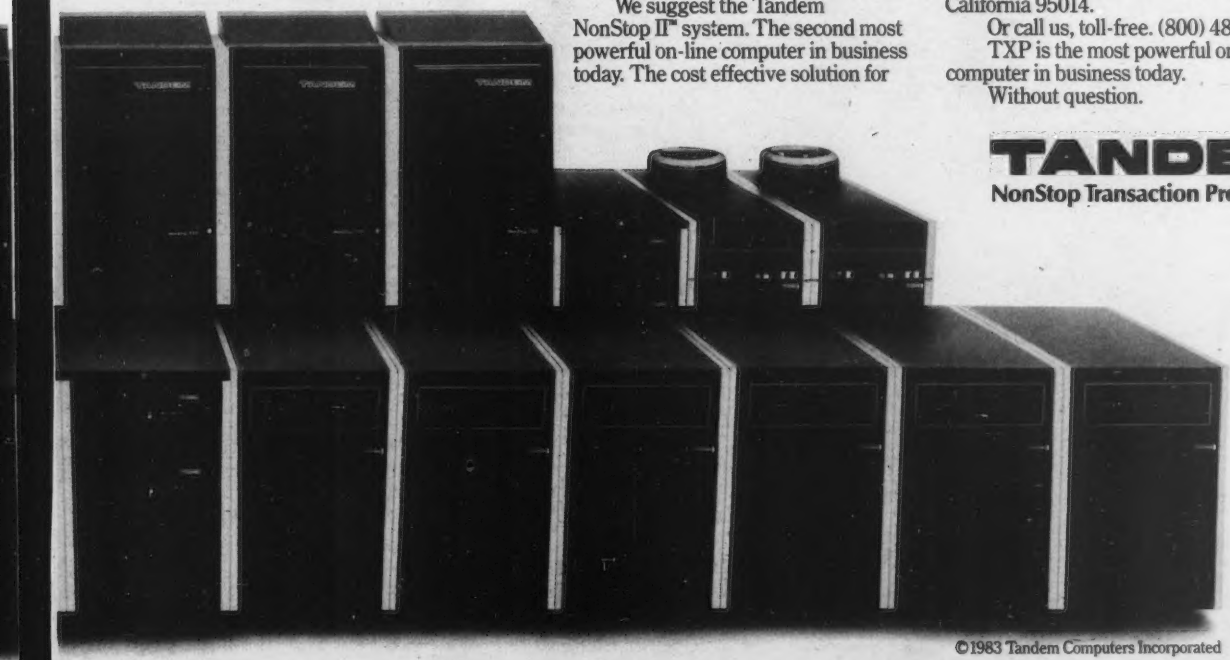
Or write Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014.

Or call us, toll-free. (800) 482-6336.

TXP is the most powerful on-line computer in business today.

Without question.

TANDEM
NonStop Transaction Processing



AIDS from page 80

BUSINESS CONTROLS CORP.
SB-5/CDD interface module

Business Controls Corp. has announced a software module that interfaces its SB-5 Automated Cobol Applications Software Development System with the Digital Equipment Corp. Common Data Dictionary (CDD).

The CDD option is included with many of DEC's VAX-11 series of computer installations. The SB-5 is a system of programs that automates design, production, documentation and maintenance of Cobol applications software for DEC's series of VAX-11 systems and for DEC's PDP-11 and Decsystems 10 and 20. The module costs $5,000.

Business Controls, 507 Blvd., Elmwood Park, N.J. 07407.

MICHAELS, ROSS & COLE, LTD.
Maintainer

Michaels, Ross & Cole, Ltd. has announced Maintainer, a program generator for the IBM System/38.

Maintainer features multi-file editing, on-line Help keys, automatic audit trail for any modifications and message file interface. A single CPU license costs $1,140.

Michaels, Ross & Cole, P.O. Box 4533, Oak Brook, Ill. 60521.

PANSOPHIC SYSTEMS, INC.
EZ/Key

Pansophic Systems, Inc. has announced EZ/Key, an integrated prompter and language-sensitive editor for use with its Easytrieve Plus information retrieval and data management system.

According to the vendor, EZ/Key combines a full-function, menu-driven prompter with a full screen editor, allowing flexibility in either mode of operation. A language-sensitive editor checks all statements for errors and is said to eliminate the need for compile runs while building programs.

EZ/Key is designed for use with IBM's TSO, CMS and CICS teleprocessing environments. For CICS, EZ/Key is available in DOS and OS versions priced at $9,000 and $15,000, respectively.

Pansophic Systems, 709 Enterprise Drive, Oak Brook, Ill. 60521.

MCCOSKER CORP.
Program Genie

McCosker Corp. has announced the Program Genie, said to be an on-line application development system for the IBM System/38.

According to a spokesman, Program Genie is designed to assist in the creation of on-line programs for the System/38. The system will create IBM RPG-III on-line programs based on a physical file Data Dictionary System (DDS) member which exists in a defined library and source DDS file.

Program Genie will create both the DDS display specifications and the RPG-III program code to provide on-line update or display capabilities..

Program Genie is licensed for $3,500.

McCosker, 740 Julie Ann Way, Oakland, Calif. 94621.

APPLICATION PACKAGES

COMPUTER ASSOCIATES INTERNATIONAL, INC.
CA-Asset Management

Computer Associates International, Inc. has announced an on-line, interactive accounting system for tracking capital equipment.

CA-Asset Management is designed to run under IBM's DOS and OS operating systems and is the final release in Computer Associates' Financial Management Software Series.

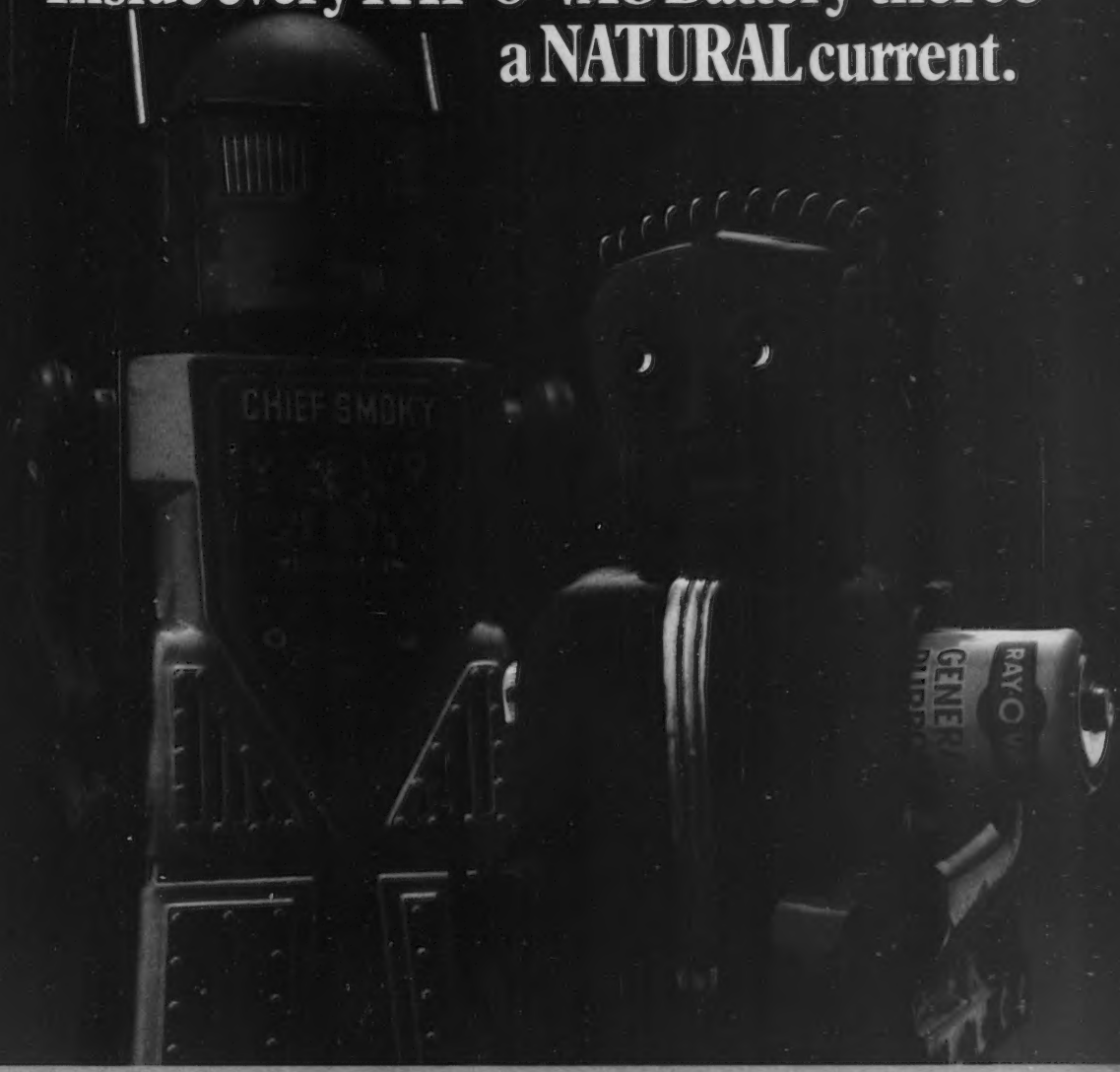
It is intended for use by companies with significant fixed assets. It reportedly tracks a company's assets, updates the general ledger for depreciation calculations, maintains an audit trail and produces reports.

The software is menu-driven with on-line Help screens. It is designed to calculate tax credits for capital equipment and provide "what-if" projections on depreciation. License fees are $27,500 for DOS systems and $30,000 for OS systems.

Computer Associates International, 125 Jericho Tnpk., Jericho, N.Y. 11753.

See **PACKAGES** page 86

Inside every RAY-O-VAC Battery there's a NATURAL current.



NATURAL Fourth-Generation Information Processing System

There's hardly a humanoid in sight who doesn't depend on Ray-O-Vac batteries for consistent, dependable power.

And there's hardly a programmer at Ray-O-Vac who doesn't depend on Software AG's NATURAL for the power of a fourth-generation application development system.

NATURAL combines an advanced non-procedural language with a range of other features that raise programmer productivity to unprecedented levels—typically 10 to 20 times the productivity of COBOL.

NATURAL's easy to learn, both for experienced staff and for end users. And NATURAL comes ready to work with Software AG's other powerful software tools:

- ADABAS, the data base management system that's brought the benefits of relational architecture to hundreds of worldwide users;
- COM-PLETE, an online teleprocessing system with its own battery of powerful program development facilities;
- NET-WORK, a series of tools to turn the promise of distributed processing into a reality; and
- PREDICT, the first data dictionary specifically designed for the fourth-generation application development environment.

With this combination of capabilities behind it, no wonder NATURAL has the largest installed base of any fourth-generation application development system in the world. So whether your business is androids or alkalines, you owe it to yourself to see what NATURAL can do to help you keep current.

Software AG of North America, Inc.
11800 Sunrise Valley Drive,
Reston, Virginia 22091
(703) 860-5050

Software AG
OF NORTH AMERICA, INC
Powerful Software Solutions

CW0213

PACKAGES from page 84

LABORATORY TECHNOLOGIES CORP.
Labtech-PC

Laboratory Technologies Corp. has announced Labtech-PC, a material testing package that includes data acquisition, critical instrument control, display and analysis control modules designed for the IBM Personal Computer.

Materials testing is the measurement of mechanical properties of liquids and solids.

The package uses American Society for Testing Materials standards and analyzes and displays test data in graphics and statistical forms, according to the vendor.

Three cards can be placed in IBM Personal Computer expansion slots: Testmate 1 ($3,500), which provides data acquisition software; Testmate 2 ($5,500), said to include data acquisition and instrument control software; and Testmate 3 ($4,000), which runs either data acquisition or instrument control software.

Laboratories Technologies Corp., 328 Broadway, Cambridge, Mass. 02139.

ABC MANAGEMENT SYSTEMS, INC.
ABC/MM for IBM System/36

ABC Management Systems, Inc. has announced an IBM System/36 minicomputer version of its ABC/MM maintenance management package, previously available only on IBM 370, 4300 and 30 series mainframes.

According to a spokesman, the package is designed for use by manufacturing, processing, utility, gas and oil, transport and industrial, public works, school and hospital facilities. ABC/MM is said to be menu-driven and totally on-line. It combines a common data base and eight integrated program modules which are available separately.

The modules are said to accommodate labor records and time cards, work-order scheduling to available capacity, job estimates and backlog planning, time and accounting performance control, budget control, equipment history, parts and inventory and preventive maintenance. The package requires a minimum of 64K bytes of memory.

ABC/MM is priced between $11,000 and $65,000, depending on the number of modules selected. Maintenance is an additional 10% per year option.

ABC Management Systems, Suite 3, 805 Dupont St., Bellingham, Wash. 98225.

REAL DECISIONS CORP.
1984 'Financial Modeling Decisions'

Real Decisions Corp. (RDC) has announced the publication of the 1984 "Financial Modeling Decisions," which contains reviews of 30 major decision support system products.

In its seventh year of publication, "Financial Modeling Decisions" benchmarks 30 financial modeling software packages with real-life business problems, RDC said. The report tests the products' responses to five classic business problems, including new product planning, cash-flow analysis, long-range planning, sales-driven models and short-term models.

The RDC report displays actual code used to solve portions of each benchmark problem, illustrating the capabilities found in each of the software products.

Separate chapters for each product are said to provide detailed information about capabilities in modeling, "what-if" analysis, data handling, reporting and graphics. The full "Financial Modeling Decisions" report is priced at $995, according to RDC.

Real Decisions, 123 High Ridge Road, Stamford, Conn. 06905.

TRANSCOM DATA SYSTEMS, INC.
Tolas-Salestream

Transcom Data Systems, Inc. has announced an enhancement designed to allow users of the Tolas wholesale and distribution package to provide their salesmen and customers with remote access to host computers.

The enhancement, Tolas-Salestream, reportedly allows direct customer order entries with one-button access from terminals in the customer's place of business and other business functions.

Tolas, which operates on Digital Equipment Corp. VAX-11 and PDP-11 systems, was designed to be customized with the Tolas-Salestream for each user.

It reportedly allows salesmen to use portable terminals to verify item availability, enter orders and provide accurate pricing when calling on customers.

Enhanced versions of Tolas will be available in March.

One-time license fees range from $2,000 to $6,000, depending upon the type of CPU and number of modules, the vendor said.

Transcom Data Systems, 1380 Old Freeport Road, Pittsburgh, Pa. 15238.

FUJITSU SYSTEMS OF AMERICA
7880, 7990 enhancements

Fujitsu Systems of America has introduced two enhancements for its 7880 and 7990 point-of-sale terminals: a dial-out credit authorization system for master terminals or terminal support processors and an interactive post void capability.

According to the vendor, the credit authorization function checks credit, replacing telephone inquiries and searches through credit card control books.

The interactive post void feature requires less entry of information, improving the accuracy of daily totals, a company spokesman said.

The credit authorization system is priced at $100 per master terminal; the post void is $10 per store controller.

Fujitsu Systems of America, 9841 Airport Blvd., Los Angeles, Calif. 90045.

SOFTWARE & SERVICES

HEWLETT-PACKARD CO.
HP Tex

Hewlett-Packard Co. has announced a document-formatting system for users of its HP 9000 Series 200 16-bit engineering workstations.

Dubbed HP Tex, the package enables users to create and print complex expressions and equations commonly used in scientific and technical fields, according to a spokesman for the vendor. The system utilizes the engineering workstation and the HP 2688A workstation laser printer.

HP Tex accepts text files from the HP 9000 Series 200 computers in stand-alone mode or on HP's Shared Resource Manager, according to a spokesman for the vendor.

Embedded commands can be used to specify formatting features. Page size reportedly can also be specified and printed in a multicolumn format.

The HP Tex formatting system is priced at $4,000. The HP 2688A workstation laser printer is priced at $25,950, and prices for the HP 9000 Series 200 engineering workstation begin at $3,950.

HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

MCBA, INC.
Wang M/L

MCBA, Inc. has announced Wang M/L, a mailing-list package written in Cobol for the Wang Laboratories, Inc. Wang VS small business computer.

The Wang M/L interfaces optionally with MCBA's Wang accounts payable, accounts receivable and payroll packages, enabling users to update automatically lists of customers, vendors or employees, according to an MCBA spokeswoman.

The system supports an address list of unlimited size and provides complete letter maintenance, according to the spokeswoman.

In addition, it offers flexible print selection by contact name, company name, Zip Code, date added to the list, date of last change, state, country, source, user-defined codes and status, according to the MCBA spokeswoman.

Source-code licenses for the Wang M/L range in price from $1,500 to $4,000, depending on the Wang VS model.

MCBA, 2441 Honolulu Ave., Montrose, Calif. 91020.

COMPUTER APPLICATION SERVICES
Electronic Mail System

Computer Application Services has introduced the Electronic Mail System (EMS), an application software package which allows users of IBM 3270 series terminals to connect to Telex Corp. Telex and TWX services.

The package adds internal message service to existing IBM 370 and 4300 series mainframe computers running IBM CICS data communications software under IBM OS or DOS operating systems, according to the vendor.

EMS is menu-driven, and the software enables users to reformat and retransmit messages and to retrieve and transmit existing business records without rekeying, according to the vendor.

The software will accommodate up to 100,000 mailboxes and can handle messages as large as 10,000 lines, according to the vendor.

The price is $8,900 for CICS running under OS and $7,500 for CICS running under DOS. The product is marketed by Marc Rubin & Associates.

Marc Rubin & Associates, Suite 210, 12535 Seal Beach Blvd., Seal Beach, Calif. 90740.

HEWLETT-PACKARD CO.
HP Pay

Hewlett-Packard Co. has announced HP Pay, a payroll software package for its HP 3000 line of computers.

The vendor said the system's interactively maintained tables can be tailored to meet user needs, a process that requires no modification of source code or recompilation of code. The system provides menus and interactive screens; real-time updates of data are on-line for review upon data entry.

HP Pay is integrated with HP General Ledger. Data accumulated in HP Pay files can be incorporated in general ledger reports and quarterly and yearly statements, the vendor said.

Provisions are included in the system for all standard U.S. and Canadian government reports.

HP Pay is bundled with implementation assistance and one year of tax information updating. The bundled system is priced at $21,400.

HP, 3000 Hanover St., Palo Alto, Calif. 94304.

GOAL SYSTEMS INTERNATIONAL, INC.
Phoenix Release 4.1

Goal Systems International, Inc. has announced Release 4.1 of the Phoenix System, which the vendor described as a computer-based training system for IBM mainframe and plug-compatible system users.

The new release reportedly features automatic terminal allocation which allows a user to write a sign-on logo, activate automatic registration of terminals, require users to enter account numbers for billing and control display of input fields.

The Phoenix system reportedly provides quick development of courses without programming, immediate delivery of courses to any terminal in a network and updating of course material. Phoenix provides computer-assisted instruction for teaching skills and operating procedures and computer-managed instruction for testing students' skills and for managing employee training time, company training programs and multimedia resources.

Phoenix operates under IBM's VM/CMS, MVS, VS1 and SVS operating systems. A three-year renewable license is priced at $875 per month.

Goal Systems International, 5455 N. High St., Columbus, Ohio 43214.

See **PACKAGES** page 88

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DATA DECISIONS
Mainframe and minicomputer software survey

Data Decisions has published a survey that describes 87 mainframe and minicomputer business administration and management software packages.

The survey includes dot-chart indexes and written descriptions of key features, according to the vendor. Each entry includes the purpose of the program, installation requirements, unique functions, product interfaces, extra-cost options and source code availability, the vendor said.

The survey costs $29.

Data Decisions, 20 Brace Road, Cherry Hill, N.J. 08034.

TRES SYSTEMS, INC.
Employee Information System/2000 enhancement

Tres Systems, Inc. has announced an enhanced version of its Employee Information System/2000 software package for IBM and compatible mainframes.

With the new release, on-line, real-time payroll and personnel functions include benefits and compensation administration, Affirmative Action planning, position control, labor distribution and Occupational Safety and Health Administration compliance, according to the vendor.

The enhanced on-line capabilities are said to provide immediate access to the employee master file, optional real-time update and data base inquiry.

The package ranges in price from $75,000 to $175,000.

Tres Systems, 16775 Addison Road, Dallas, Texas 75248.

EPS, INC.
FCS-EPS Version 1.03

EPS, Inc. has announced an enhanced version of its FCS-EPS decision support system for Hewlett-Packard Co.'s HP 3000.

Version 1.03 is said to feature

Continued on page 90

The genius of Team Xerox.

XEROX

The 8010 professional workstation has always been known as a computer of dazzling capabilities, especially in its graphics, information processing and document preparation.

Team Xerox

But what some people may not know is that the 8010 is also the key element in Team Xerox, a system of office machines designed to work together like a team.

When part of an Ethernet network, the 8010 can work with a wide array of word processors, mainframes, personal and business computers, printers, electronic mail and file services, facsimile terminals, communicating Memorywriters, other networks and, of course, other 8010's. It also provides 3270 and TTY emulation.

Its full 17" bit-mapped screen lets you view two full pages simultaneously and open up to six documents at a time without covering up a previous document.

It's also the only workstation that can create and print documents in more than a dozen languages, including Russian and, for the first time, Japanese (Katakana, Hiragana and Kanji).

While other workstations may use Xerox innovations like the mouse, icons, windows, property sheets and combined text and graphics, the 8010 simply does more with them.

For example, the 8010's extensive software is fully integrated, to allow you to work with text and graphics simultaneously. You can draw a flowchart right in the middle of a full page of text without having to resort to a separate program and limited buffer "scratchpad" or "clipboard."

In terms of capabilities, ease of use and overall value, the 8010 would have to be considered the stellar workstation in the industry.

For more information, call 800-527-1922 (in Texas, 800-442-0152), or send in the coupon. Or ask anyone who's ever used the 8010.

Xerox Corp., Box 470065, Dallas, Texas 75247.
☐ Please have a sales representative contact me.
☐ Please send me more information.
Name_____ Title_____
Company_____
Address_____ City_____
State_____ Zip_____ Phone_____

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Continued from page 88

graphics and statistics capabilities and a link to the HP Image data base manager.

The graphics module reportedly allows translation of data in a model to a histogram, vertical and horizontal bar charts, pie and star charts and X-Y and bubble plots. The statistical module was designed for basic statistics and test of significance and correlation. The enhanced version is available starting at $25,000.

EPS, One Industrial Drive, Windham, N.H. 03087.

DATA BASE MANAGEMENT SERVICES

SYSTEMS PROGRAMMING LTD.
Adaprep enhancement

Systems Programming Ltd. has announced an enhanced version of Adaprep, a data-dictionary-driven data management language for users of Cobol and PL/1 systems based on Software AG of North America, Inc.'s Adabas data base management system.

The enhancement uses Software AG's Predict data dictionary and integrates it by using the file and field attributes to generate executable code, according to a spokesman for the vendor.

Adaprep is said to cut programming effort by eliminating the need for Direct Call programming or Adamint procedures, as well as automatically integrating and activating the data dictionary, the spokesman for the vendor said.

The product updates the data dictionary with field and file information to produce reports on data base usage by field and program, the spokesman said.

Adaprep is licensed at $17,000 for IBM DOS systems and $21,000 for IBM OS systems, both VS1 and MVS. Maintenance fees are equal to 15% of the license fee, according to the vendor spokesman.

Systems Programming, Suite 220, 131 Steuart St., San Francisco, Calif. 94105.

REMOTE COMPUTING SERVICES

MARTIN MARIETTA DATA SYSTEMS, INC.
Subscription Service

Martin Marietta Data Systems, Inc. has announced the Subscription Service, which the vendor said offers users fixed-price time-sharing on its IBM processors in IBM VM and MVS environments.

A Subscription Service user purchases a block of computer resources at a fixed price rather than paying on a usage basis, a vendor spokesman said.

In addition to the IBM operating systems, users of the Subscription Service have access to a variety of productivity tools and application systems.

Prices for the Subscription Service begin at $15,000/mo, according to the spokesman for the vendor.

Martin Marietta Data Systems, 6303 Ivy Lane, Greenbelt, Md. 20770.

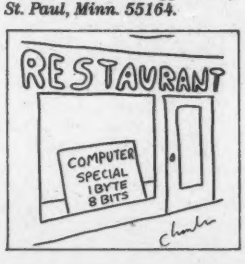
ON-LINE DATA BASES

EUROPEAN LAW CENTRE LTD.; WEST PUBLISHING CO.
Eurolex, Westlaw access

European Law Centre Ltd. and West Publishing Co. have announced a joint agreement to provide mutual access for their subscribers to legal information data bases offered by the companies.

European Law Centre's Eurolex data base is now accessible through West Publishing's Westlaw computer-assisted legal research service, and the Westlaw service is available to Eurolex subscribers.

West Publishing, P.O. Box 43526, 50 W. Kellogg Blvd., St. Paul, Minn. 55164.



CONTINENTAL RESOURCES.

One company. All the answers.

Whether you're adding high-tech products to your company for the first time or upgrading an existing system, you have a choice: You can deal with multiple vendors, conflicting claims, long lead times and poor service, or you can call Continental Resources.

Whether you're looking for a personal computer, dumb terminal, disk drive, high-speed line printer, data communications equipment, or an advanced graphics system, Continental has the answer. Products of almost every description from virtually every industry leader:

- Anderson Jacobson
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- Computer Devices
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- Digital Equipment
- Diablo
- Data Products
- General Data Comm (or GDC)
- Genicom (G.E.)
- IBM
- Lear Siegler
- Micom
- NEC
- Northern Telecom
- Texas Instruments
- Teletype
- Ventel
- Visual Technology

But Continental doesn't just offer great selection. We provide a total support package unmatched in the industry. Special interface problems? Our Sub-Systems group is expert at solving even the trickiest problems. Complex data communications needs? Our Datacomm group will help you find the best solution. Not sure of what you need? Our specialists will evaluate your needs and recommend the right system for you. **And that means software, too. And supplies like ribbons, printwheels, and paper — even complete work stations.**

In short, you're guaranteed the most informative, professional assistance available — before and after your purchase. And Continental even provides complete on-site service.

Our national network of offices provides sales, technical and service support backed by more than 20 years of experience.

Even if you're not ready to buy, Continental offers a host of rental or leasing options — one is sure to meet your needs. So call us the next time you need high-tech products or services. Continental Resources is the one company with all the answers. **We deliver what you need.**

CONTINENTAL RESOURCES, INC.
175 Middlesex Turnpike, Bedford, MA 01730

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Northern NJ Area
(201) 654-6900
San Francisco Area
(408) 727-9870
Philadelphia Area
(609) 234-5100
Los Angeles Area
(213) 638-0454

Spartacus — the spirit of distributed processing

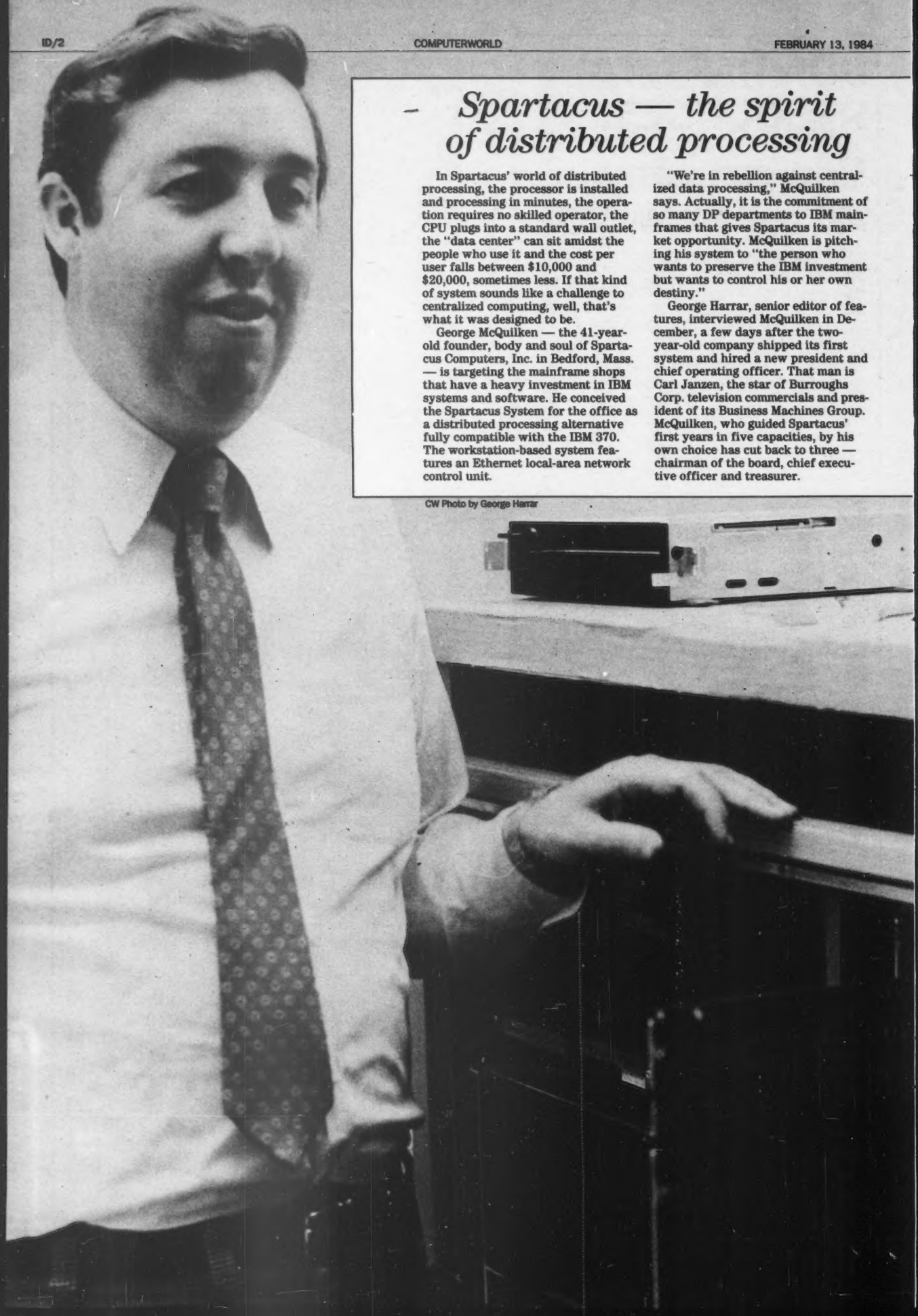
In Spartacus' world of distributed processing, the processor is installed and processing in minutes, the operation requires no skilled operator, the CPU plugs into a standard wall outlet, the "data center" can sit amidst the people who use it and the cost per user falls between $10,000 and $20,000, sometimes less. If that kind of system sounds like a challenge to centralized computing, well, that's what it was designed to be.

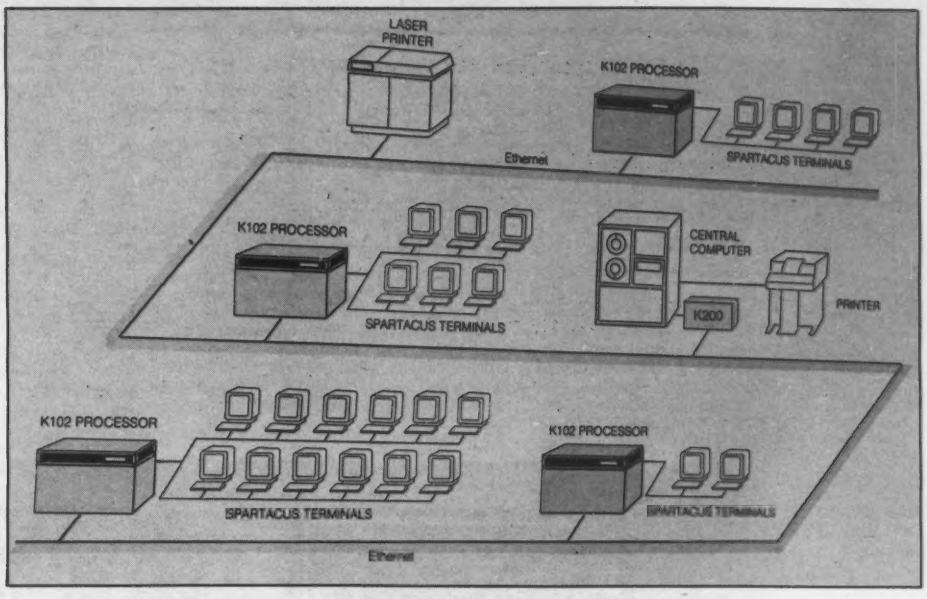
George McQuilken — the 41-year-old founder, body and soul of Spartacus Computers, Inc. in Bedford, Mass. — is targeting the mainframe shops that have a heavy investment in IBM systems and software. He conceived the Spartacus System for the office as a distributed processing alternative fully compatible with the IBM 370. The workstation-based system features an Ethernet local-area network control unit.

"We're in rebellion against centralized data processing," McQuilken says. Actually, it is the commitment of so many DP departments to IBM mainframes that gives Spartacus its market opportunity. McQuilken is pitching his system to "the person who wants to preserve the IBM investment but wants to control his or her own destiny."

George Harrar, senior editor of features, interviewed McQuilken in December, a few days after the two-year-old company shipped its first system and hired a new president and chief operating officer. That man is Carl Janzen, the star of Burroughs Corp. television commercials and president of its Business Machines Group. McQuilken, who guided Spartacus' first years in five capacities, by his own choice has cut back to three — chairman of the board, chief executive officer and treasurer.

CW Photo by George Harrar





IN DEPTH

An interview

George McQuilken

You recently installed your first system at Symbolics, Inc. in Cambridge. Was this installation on schedule?

To the day. Unlike most companies, we're pretty conservative. It must be the IBM training. We've run machines here since December of '82. Symbolics was our first real shipment of a manufactured machine, but we have another machine installed at our beta test site, and that ran for three months — the whole test — without failing.

One thing really proving to be important is plant site integration. I can explain that best by contrasting it: Most large computer manufacturers really do the integration of their hardware and software at the customer site. For example, if you buy a computer from IBM, the processor might come from Endicott, the disk might come from San Jose, the tapes might come from Tucson, the terminals might come from Kingston; the software is distributed from Hawthorne, N.Y. This equipment has never run together. Consequently, installing a computer and shooting bugs and so forth can sometimes take several days.

Our machine leaves here with the peripherals integrated. They're all tested with the system, and the operating system and networking software are installed here, too. It's tested here as a complete system. Therefore, it isn't really surprising to us that a machine works when we get it to a customer. It would be more surprising if it didn't.

Your installation at Symbolics took 30 minutes —

Twenty-nine.

Under 30 minutes. That establishes a mark hard for you or any other vendor to match. Were you aiming for that time?

We were aiming for not needing a skilled specialist at the remote site. These are distributed processors. So assume that we sold them to a large insurance company in Boston. They aren't buying them just to use in Boston. They're going to put them all over the U.S. By a trained staff, we mean one to two field engineers and at least one software specialist provided by the customer at a remote site. So the time isn't the thing, it's the fact that we didn't invest three to 10 man-days of effort. Neither we nor the customer put in that type of effort to make the machine go.

How many people from Spartacus were at the site?

Oh, this was our first installation, so there were a few people, but I think only one guy was doing any work. We do believe in the idea that when you send a machine, you do

want to send a man or a woman along to install it. But it's one person, and his skill level needs to be more like a customer support person than an engineer or systems programmer. I'm trying to think how long it takes to set up a personal computer — it's in exactly the same range.

Ours comes in a big crate rather than a cardboard carton, so you have to take your wrench and unbolt the crate, and you have to connect a few cables. That's what takes the 30 minutes. But there is nothing magic about 30 minutes. It doesn't matter if it is 30 minutes or an hour, it's that it can be set up immediately upon receipt and will be running that day.

How involved were you in designing the K102?

The whole preliminary design was done by me. All the major features and capabilities were done by me.

When you set out to develop the system, what features were indispensable in your vision of it?

Operator-less operation — that was the key thing, because if you look at the trends and the economics of computing, it's clear to all of us that hardware is declining rapidly in cost. That's the reason why personal computers and distributed processors are so popular. This has been going on for years. But the cost of supporting the machine — the personnel — is a big factor. When I was still at IBM, they had the largest private network in the world. They have something like 600 processors on five continents and in 90 cities, and you say, "Why aren't there more nodes and more networks like this one." One of the major reasons is that in each and every one of those places, you have a computer room.

Now a computer room, even a small one, can easily cost you a quarter of a million dollars to put in your building. That's a raised floor, extra power and cabling, extra air conditioning. And then almost every system has an operator, trained and skilled. So when you look at the annual operation cost of the computer, what are you going to attack? Well, you can attack the cost of the computer, but you attack these other costs, too.

One of the reasons our machine installs so rapidly is that it runs in a standard office environment off a standard wall outlet. So you see there's little preinstallation work that has to be done. The major thing I wanted to do was build a computer that was IBM-compatible but ran in the office and didn't need a skilled operator. I like the term "midframe." It's 32 bits, and by that I mean it's 32 bits in the processor, in the registers, through the internal buses — none of this fiddling . . . it's a full 32-bit processor. It's fast through the buses, it's fast through the I/O structure. It's much more like a mainframe.

Did you have a target price in mind that you had to come in under?

When I was first starting, I was concerned with cost per user as much as cost per system. It's clear you need a cost per user of under $20,000. I don't know why that's a target. We knew we probably had to target the market under $100,000. There's plenty of room in the $100,000 to $200,000 market also.

Then we looked at features and disk storage. We talked a great deal with possible customers. I had very good contacts in that field, plus I had experience with IBM working and designing distributed processors. Right now the machine can easily come in under $10,000 a user, but again, it depends on the features and processing power. People who are used to using a mainframe use a lot of disk storage in computing. They're not people who can do their work on a personal computer. But we're easily under $20,000 for each user and in most cases we are under $10,000.

One of the reasons our machine installs so rapidly is that it runs in a standard office environment off a standard wall outlet. So you see there's little preinstallation work that has to be done. The major thing I wanted to do was build a computer that was IBM-compatible but ran in the office and didn't need a skilled operator. I like the term "midframe."

With $20,000 per user as an upper limit in your mind, what did you have to leave out of the K102?

You couldn't have made it a single-user workstation, not and maintain the complete IBM compatibility. So there was no choice but to include some of the characteristics of a mainframe and some of a workstation. We focused on the idea that we would appeal to a department of a large company that has a number of users, anywhere from three to 10 people. We felt a department isn't big enough to need 75 users. Then you have a large, time-sharing mainframe.

What kind of system would this department buy from you?

The system is an integrated pack-

age, so when we talk about a system, it has the disk built in and the terminals, of course, attached to it, and it has the operating system software built in. The only things lacking are the user programs and data. Now since we're assuming that this person has a commitment to IBM mainframes, he already has programs and data. They're in the corporate data center on the mainframe. What we have is a networking program to attach to that. That's one of the things we think is a real value-added — we're protecting the investment in programs and data.

IBM software — there's no problem running . . .

No problem. Most IBM software will run with no modification, change or anything on our machine.

You say "most." What would fall in the category of not running?

Things that give you trouble are going from one release to another of IBM software. But I don't like to use the word "most," I like to say "all." But if you look at IBM's recent product announcements, like the XT 370, you notice they say, "This runs *most* software." IBM has a diversified product line, and it's hard for me to say "all." If IBM won't say that all your software will run on their machines, then I don't think it's fair to ask me to. As much will run on ours as will run on theirs . . . model to model and release to release. For example, the IBM compilers will run on our machine. Some of the decision support software you see around — we've tested things like [Information Builders, Inc.'s] Focus, [Management Decision Systems, Inc.'s] Express and [SAS Institute, Inc.'s] SAS, and that all runs on our machines.

You were targeting a very particular niche in the market.

The broad-scale niche is distributed processing, but the thing we decided is that systems would be easier if the different nodes in the network were compatible. This sounds obvious, but it wasn't obvious when IBM designed the 8100. It isn't obvious to a number of people that in some cases people would get a large IBM mainframe and put a number of DEC [Digital Equipment Corp.] systems or Data General [Corp.] systems around as remote processors. But in most cases, they have run into programming and compatibility problems with these things. So we were trying to build the distributed processor and remove the compatibility problem. That was the niche.

Or to put it another way, there are many people who currently use large mainframes in big organizations and for one reason or another are dissatisfied. They're dissatisfied either because the data center is far away and they can't get their output or the data center distributes charges to them that they think are unreasonable. These people would like to buy a minicomputer, and they may have looked at machines from other people. But the fact is that to do that, they would have to rewrite their programs and they don't want to make that investment. So again, the real niche is the person who wants to preserve the IBM investment but wants to control his or her own destiny. So really, a lot of the people who buy personal computers have some of the characteristics we like.

How about the IBM 4361? That came out after you started Spartacus. Was it a surprise?

No, not at all. There really is nothing new or novel about that processor. It's basically a faster model of the 4331, when you look at it. So they've improved the price/performance in their processors. It would be great for us and for every other competitor of IBM if they never improved their capabilities. But we can't expect that. The 4361 still really is designed to work in a computer room, to have an operator, to have a full complement of disks and peripherals around. I don't know what the average cost of one of those configurations is, but I know the average price of a 4331.

A survey done by International Data Corp. said the average price was $370,000 — that's a complete system, not CPU. So I imagine a 4361 typical configuration comes in at something like $400,000. You can see why I feel that we don't compete directly with a $400,000 machine that needs a computer room and a trained staff.

But if offshoots of the 4361 head the same way as you are, then they become prime competitors.

That's correct. We do have some features that IBM doesn't have in their machines. I think we're a real technological leader in this business of unattended operation, automatic system start-ups and in terms of built-in diagnostics. But given some lead time and the fact that they might push to learn from our innovative efforts, they could do that.

The one thing we do that they are not likely to do is interface directly to [Xerox Corp.'s] Ethernet. Essential to a distributed processing strategy is good local-area networking. There is a lot of local-area networking, but it varies very much in quality, consistency, types of devices you can attach to it. We know pretty well that IBM will have its own local-area network. We anticipate that they have little motivation to connect to Ethernet and make it easy to attach devices from hundreds of other manufacturers to their machines. We don't have that motivation, so I think our Ethernet strategy alone gives us a market niche which no one

else is in right now.

What other strategies do you have or products will you be coming out with, perhaps to counter IBM in one or two years?

I have some pretty good ideas, but I don't want to tell everybody. There's two things I see us as doing probably better than IBM. On the lower end, our virtual machine implementation I believe is superior to theirs. Using the concept of a virtual machine and combining local-area networking with virtual machine concepts are a real value. IBM has pretty much changed its mainframe strategy to its SNA [Systems Network Architecture] strategy to its XA [Extended Architecture] strategy. All those strategies are going to make it hard for them to have a consistent, compatible low-end line of processors. My evidence for that is that they don't have that today. They have at least three lines of processors in the 370 area — they've got the PC XT-370, 4361-class processors with a version of VM and then the XA class processors, without a full VM implementation on them today.

They have three different classes of incompatible machines and slightly different operating systems out there today. So it's hard to see exactly how they are going to do everything we do and be compatible up and down their own product line, which is probably more of a problem for them than we are.

Why did you leave IBM?

To do this — entirely opportunity. I had done a number of relatively successful projects at IBM, and I felt that there were certain barriers there. I like to work on innovative projects that advance the practice of computing. I saw the chance to do that outside as better than inside. I'm not the only one, if you look at all the high-tech start-ups along Rt. 128 here and look at the number of people who felt it was in their best interest to leave DEC or Prime [Computer, Inc.] or Data General and start companies. It's clear I wasn't the only one in the industry feeling this sense of frustration. But it was nothing to do with IBM. IBM is a great company.

Did the opportunity come to you, or did you develop the idea?

I developed the idea myself. I had been working at IBM as editor of the *IBM Systems Journal* and had worked a little bit with the 8100 and SNA people. I then went to IBM's Scientific Center in Cambridge, Mass., and designed the principal distributed processing features that are in the 4300 line today. So I knew I could do this. My project there was ending up. It had been put in the IBM product line — the product division had taken it over. It was time for me to crank up a new project.

So after a great deal of deliberation, I thought if it was time to start cranking up a new project, it was a good time to leave. I didn't want to leave in the middle of a project, and I sure as heck didn't want to design something while I was at IBM and leave and build it, because that would really be unethical. So basically I left with no capital, no job, no anything. In fact, the management there, I think, thought it was rather strange. They had never had anyone resign to take no job before. I was candid. I told them I was going to leave and start a computer company. I don't think they believed me. They may believe me now.

How did you arrange capital?

Over the years, I had paid a lot of attention to things like the MIT Enterprise Forum. I went out and got myself a couple of strong business advisers who were prepared to give me assistance. Their first insistence was that I write a business plan. In a big company, I would have started designing a processor. But, really, I spent the first five or six months out of IBM writing and revising a business plan, recruiting the basic team of people and talking to potential investors. And that was one of the most stressful six months of my life, because my money was running out.

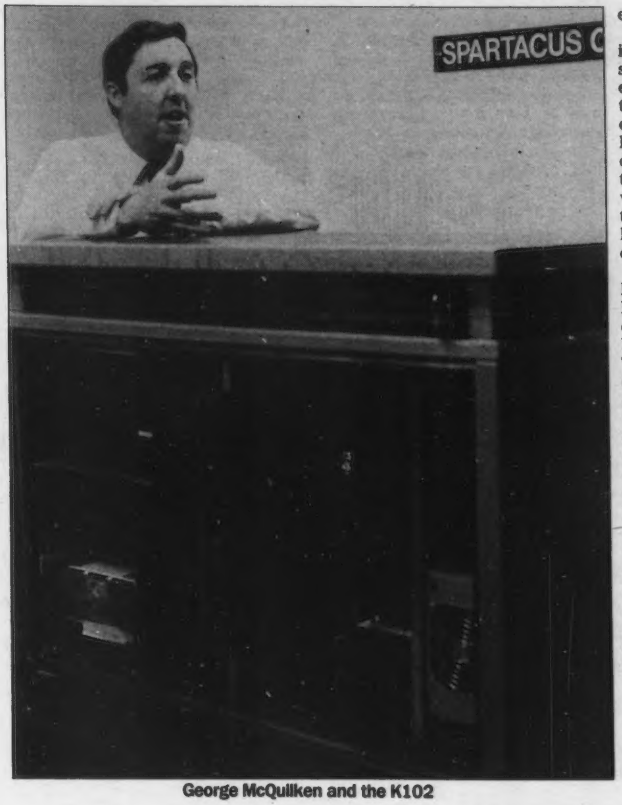
The venture capital community likes a repeater — they like people who have started companies before and who are known to them. I was coming out of IBM; I was unknown to them. So I had to find a couple of investors who weren't professional venture capitalists to put up the first round of seed money, and then I was able to do some pilot studies and licensing of our software to raise some other money. So we were relatively late. We were in business and had machines running before we did our first round of professional venture capital financing. That's actually been good because the early employees and I have maintained much more control of this company than at similar companies, from what I hear.

You have edited the IBM Systems Journal, taught at Boston University and Northeastern University, done design and research at the IBM Scientific Center. Did the venture capitalists look at that background and say, "Well, where is your managerial experience?"

They most certainly did.

How did you answer?

I had never run a big operation, so that was something that was a source of concern to the venture capital community. But from my viewpoint, I knew a fair amount. I reported very high in the IBM organization. My third level manager would have been the president, John Opel. I was certainly one of the youngest manag-



George McQuilken and the K102

ers at IBM corporate headquarters.

The initial advice the venture capital community gave me was that I should go out and find an experienced executive as a partner, and then the two of us should start a company and they would fund it. I heard this from a number of venture capital firms, so I went on an executive search, and I must have talked with everyone I could find around the Rt. 128 area who had been a high-level executive at one of the other companies.

The problem is that when you have nothing but an idea, you don't have credibility with the venture capitalists and you don't have credibility with other executives either. The type of person who has run a big operation is a little more conservative and isn't impressed by a guy who's working out of his house. To some extent it was fortunate, because I had the pleasure of two years of running the company myself as chairman of the board, chief executive, president, chief operating officer and treasurer. But I'm tired of being all those things. Now we're able to have Carl Janzen join us. Carl has run a $160 million operation at Nixdorf, and he was president of Burroughs Business Machines Group. I think their revenues must be in the $3 billion range. So you see I got a much stronger executive than I could have gotten a year ago.

What will the addition of Carl free you to do?

It has a lot to do with the direction of the company, both the technical direction and the business strategy. In a small company, this is all tied together and there isn't much time to think about the future. It's clear to me that we can't be a one-product company. In fact, we aren't a one-product company. We have a couple of different product lines now. We need to broaden our product line. We have to be prepared for the fact that IBM does introduce new products from time to time, and so I can do all that as well as deal with the financial community.

In order to become a worldwide manufacturing company, we're going to have to raise a substantial amount of money. I also intend to keep the research direction of the company directly under my control. I have no great desire to control a large development organization. I'm concerned about the direction of the company, the direction of research and our external relationships with the technical and academic communities and the business and financial communities.

The other thing is, it was the right time. There's no reason people should think I can run a company with one to 5,000 employees, because I never have. Carl has run bigger operations than that. So I think we have extremely complementary skills.

On a personal level, I will say that I'm coming off close to three years of working 80- to 100-hour weeks, and I'm tired. A good friend of mine called me up. He knew Carl was coming on, and he said, "How does it feel

to be retired?" That's a little extreme because what we're going to do is make the company grow and expand the work load too.

How many employees do you have?

On the payroll, there are 77. Some of those are co-op students and part-timers.

Are you using your connections at Boston University?

We seem to get a lot of people from there. Carl Janzen went there, and he also went to MIT. I'm an MIT grad; they are one of our investors. One of the problems with starting a company is that you have to do everything fast. We were slower at rounding up capital than some of the other companies, but consequently, we got a better deal — we got more capital for less of the company than the other prestige start-ups around here. I was slower to recruit the executive talent, but now I've got probably one of the finest executives we could find to join the company. He knows the IBM world — he was there for 14 or 15 years. He managed their whole sales operation in this region at one time. So you see, we seem to be doing things six months to a year later than conventional wisdom says, but when we do it, it seems to work a little better.

That's measured growth rather than . . .

Oh, we'd like to grow explosively. As an example, the fact that we put a beta test machine out there and it ran for three months without failing, that's very impressive to people. But it didn't surprise me because we didn't ship it until we had machines running for nine months. I hear there are some companies that announce machines that they haven't developed and tested.

You've heard that?

I wouldn't know anything about this myself, of course. Even IBM announced this PC XT-370 and wouldn't even tell you what day they were going to ship it on. They say first customer ship is second quarter, 1984. Because they are IBM, people have confidence in them. But I just mean it's quite common in this industry for people to announce machines they don't have. We've announced machines we do have. We can show them to anybody.

Where would you like to be in terms of size and products in five years?

We're tracking against the real high-growth companies on Rt. 128. You can look at some of the new companies that have gotten off to a successful start, like Stratus Computer, Inc., Apollo Computer, Inc. and Automatix, Inc. It's hard to say we'll do better, but we want to track with the really high-growth companies on 128.

However, there is one thing we want to do a little differently than some of them. A few have been one-product companies that have had meteoric growth and then declined. That's what we don't want to do. We want to have a series of innovative products. I can't tell you specifically what we are going to do, but it will all be in the area of distributed processing and networking. We want to be one of the high-growth companies, but we still want to be around in 10 years. We have a lot of responsibility to our employees, to the widows and orphans who own our stock, to the community at large. I can't think of any decision we've made on a short-term basis.

What kind of pressure do the venture capitalists put on you to show short-term growth, and how involved are they in the direction of the company?

They seem to be more concerned with their companies who aren't making their plans than with companies who are. I find they're great with helpful advice. Very early on, they came in and went over all our budgets, department by department, project to project and never cut a thing. From what I'm hearing now, if anything, they feel our plans are too conservative, that we can really take this company somewhere. At the risk of sounding too rebellious — if I had wanted to have people tell me what to do, I would have stayed at IBM because they had some people who were very effective at doing that. I don't like that very much. But I like to think I take advice very, very well. That's how you build confidence with people.

How much venture capital did you raise?

We've raised over $5 million in capital. The formal fund raising this spring was for $3 million. We've been very frugal. The reason we were frugal is that we didn't have enough money to spend. Carl and I were trained at IBM, so . . .

That brings up the question about a conservative philosophy running a start-up company. Does conservative fiscal philosophy work in a high-growth, start-up atmosphere?

That's a good question, because I've heard people say that a typical California start-up grows twice as fast as an East Coast start-up. So it is true that maybe we are more conservative than we should be. But this is New England.

Did it surprise you that Symbolics is your first user? It doesn't seem to be a typical customer.

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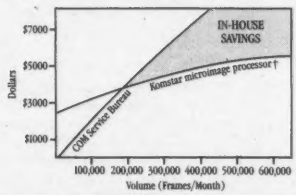

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We knew right from the start that Ethernet was a big part of our strategy, so I guess that it wouldn't be surprising that a company that's dedicated to Ethernet wants one of our machines. In fact, we aren't prepared to announce it, but I can say we're running with a couple of million dollars' backlog of some of our products now, and they are all from people who are interested in our Ethernet capability. I might have thought that one of the big IBM-mainframe commercial users around would have been our first ship, but then again, that's [the kind of company] where our beta test machine is running.

Did you realize that Ethernet would be the salient feature in many purchasing decisions?

I felt that it was substantial differentiation. The question is not just the Ethernet, however. If you look around, there are hundreds of companies that have Ethernet now. It's the particular implementation we have that's superior. If anything surprises me, it's that Ethernet isn't more widely adopted than it is today.

What deals can you tell me about right now, including the connection to Nixdorf?

The Nixdorf relationship has been a big boost for us. By working with Nixdorf, we've been able to adopt some of their technologies and components, which has really helped us keep the price of the processor down. In return, we'll be licensing some software to them, which they may or may not choose to introduce into the marketplace. But if they do, that would give us a combined market share.

To a certain extent, it's a pretty complicated relationship, because Nixdorf is a supplier of ours, they are a customer of ours and, of course, to a certain extent, a competitor. That's not that strange a relationship. If you look at Trilogy, for example, it has cooperative deals with Sperry, DEC, Honeywell Bull and so forth. We feel it's probably better to do this than to try to go it alone as a tiny company. But there is nothing restrictive in our agreements with Nixdorf. The principal suppliers are Nixdorf for boards, Visual Technology for displays, Key Tronics for keyboards . . . We must have 50 vendors involved in this.

How is this state for launching a business?

Massachusetts is a great place to start a computer company; that's why so many people do. There is the support infrastructure — the combination of legal, accounting and banking to help start a new company. You have real estate developers who are willing to talk to you. It's pretty risky just for someone to lease us this building. When you are a very early start-up, anyone who does business with you might as well be a venture capitalist. It's just some of the venture capitalists don't get any stock, but they're sure taking a risk.

You also have a highly trained and skilled work force here. Our recruiting has been excellent. We hired IBM's designated area VM specialist. We hired one of the key networking product planners at Wang. There are people around who fabricate computer parts, who make printed circuit boards, who sell cables and connectors and pins.

About everything you need to start and run and operate a computer company exists right here. That's not to say that it doesn't exist other places. I've heard that there's a place in California that has a lot of start-up companies, too. Those are clearly the two areas of the country where you have everything you need to start a company.

This building is getting tight for you in terms of space. Any plans to move or build or lease elsewhere?

We don't want to move too fast. As a start-up company, you never build, because that isn't the most effective use of your capital. At the very best, you lease. What you have to do is find an existing building, because you can't wait. We are already looking for space. This place is full and we don't have enough manufacturing capability, so we're literally borrowing space from people. We're assembling things

in other places. We really need a big building, but we aren't prepared to pay for it.

How many systems are you building right now?

Twenty.

They are ordered?

No, unfortunately. Let's put it this way — to handle the anticipated demand, we have one or two still available to qualified purchasers. We're always looking for a few good customers. We can clearly make more machines than we can sell for the time being, unless we come in with a very large contract, which we surely would like to. People don't give large contracts to small companies. Even if they're eventually going to buy 10 of your processors, they take one now. That's the commitment they'll make.

What's a target number to sell in 1984?

I can't really tell you that.

What companies do you want to sell to?

Just get a list of the Fortune 500 or the Fortune 1000. That's obviously the customer base we'd like; the problem is, it's very hard to get in there. There aren't that many computer vendors successfully doing business with them.

What types of companies within that group are most likely to buy from you?

One is the office business functions where they do what you generally classify as decision support. People want to manipulate their own data. The other is probably CAD/CAM [computer-aided design and manufacturing], which is an explosive market for everybody. Those seem to be the two areas that large companies are involved in where the demand for the right product seems almost inexhaustible. How many could be sold? If this was an IBM product, they'd probably sell 25,000 in the next week.

Are you saying that number facetiously?

No, I really believe they'd sell 25,000. They sold 10,000 4331s. They must have sold 25,000 System/34s, or more. But we're a start-up company. We worry about selling 25.

Could this product have been developed at IBM?

It would have taken two years longer. Basically this whole processor was designed and constructed . . . remember, I started by hiring some of my students. So we really started informally. Well, everyone started that way, without an office. I hired my first employee in June 1981; then we started the paperwork to incorporate. The company was officially incorporated in October 1981. We announced a product in October 1983, and then it was a hair longer to first ship. At IBM, the cycle was more like four or five years.

Did you think about suggesting this idea at IBM?

Well, I had left IBM before I had this completely thought out. Suggesting to IBM is kind of a funny thing. I mean, there are 350,000 people at IBM. I did approach my management suggesting we attach Ethernet to the 4331s. They were clearly not interested in doing that. They weren't interested then, they don't appear interested now. When I left, it sparked a great deal of interest at IBM about local-area networks, because I was fairly well-known in some areas.

We were jokingly calling the company Spartacus for the reason that he led the most successful revolt against the centralized Roman empire, and we thought of distributed processing as being a rebellion against centralized computing and centralized mainframes.

But when I was there, there was no support for a few of the things that we've incorporated into this processor. IBM makes mass-market products, so every product is a compromise. We look at this product and say, "We've got a good product, and we want to sell it." Within IBM, we'd get this far and then someone would say, "I'm not sure if we want to sell it because it would hurt our chances to sell System/34s." There are always competing projects at IBM. You could have a very successful project and not have it come out as a product. That's what takes the extra two years at IBM — the product planning.

The other thing is that if IBM announces it's a product, they'd probably sell 25,000 of them, meaning they'd have to make them. That's a large-scale organizational effort. They also have to train 10,000 sales people.

The problems they have, on the whole, are good problems.

Realistically, they can't act as fast as a small company. On the other side, for a big company, they act pretty fast.

GET EVERYBODY ON BOARD.

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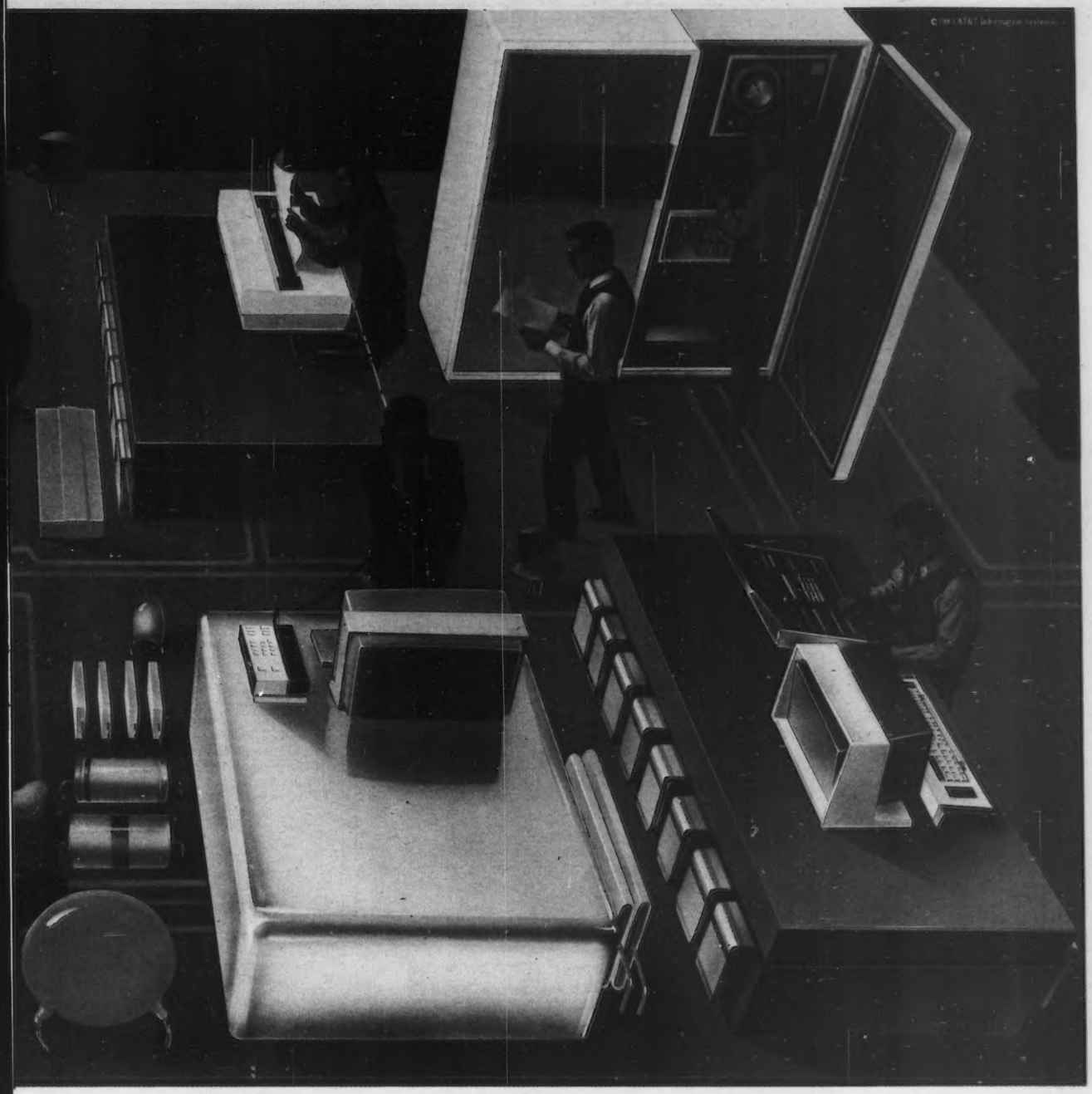

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Did you pick the name Spartacus?

Yes. It almost came out of a joke. When you have a group of volunteers and you're trying to start a company, if you don't watch it, you find you're spending all your time discussing two things: where the company is going to be — and everyone wants it close to their house — and what the name is. This gets silly, because you don't have any capital, and you don't know if you'll ever get started, and you're discussing these things.

We were jokingly calling it Spartacus for the reason that he led the most successful revolt against the centralized Roman empire, and we thought of distributed processing as being a rebellion against centralized computing and centralized mainframes. So all of a sudden, I started saying, "OK, from now on, it's Spartacus," and it has been Spartacus ever since. If there's anything unfortunate about it, it's that I don't want to give people the idea that we're somehow battling IBM. Our products are really complementary to IBM's. The fact that IBM has a successful product line and people like the company and make major commitments to it is what gives us our business opportunity. So we're in rebellion against centralized data processing — not that we think we're going to destroy it.

For 16 years you worked at IBM, which is known as the safe choice for DP managers making purchasing decisions. Now you are working for a company in which you have to convince people that it, too, is a safe choice.

It's a substantial obstacle. I've only had two jobs in my career, IBM and here. But Carl has been selling against IBM very effectively for quite a while.

How do you go about marketing the company now and developing an image?

Well, it's not an image, it's really an identity. We like to think there's a certain amount of substance behind it. I'm not sure advertising is the right vehicle for us. We know how to identify our customers — they have large buildings — and our staff has been extremely active in users groups and national societies, so we have a strong image in that community.

One thing we have tried to do is to convey as part of our identity a theme of excellence or of attempting to deal with first-class people. People, quite candidly, have been asking me what am I doing with a guy like Carl Jantzen in here, why do we need somebody like that. The answer is that he's a world-class executive and the type of person I want to work with in everything we do. The problem is, to do that we can only do a few things, but the things we do we really want to do well.

You talked about distributed processing vs. centralized. Where is distributed processing heading, and how is Spartacus going to be a part of it?

There's a huge pent-up demand for distributed processing, departmental processing. What it really comes down to is local control. You're seeing the same thing in computing now that you saw 10 or 15 years ago with terminals. People got tired of their keypunches; they wanted terminals. Today they want computers. We can argue cost, cost-effectiveness, technology or anything else. But the main reason distributed processing is a good market is that people want their own computers.

The one thing I never anticipated is the wide acceptance of the personal computer. That's the one thing that changed in the external environment. I didn't know it was going to happen, you didn't know it, IBM didn't know it. If we have a big challenge for the future, it's that we [make sure we] have the right product concept and that we're in the right marketplace. We have to find a long-term niche for ourselves, standing between the mainframe and the vast proliferation of personal computers and other office equipment. The good news is that it's an explosive market; the bad news is it's a tumultuous market and nobody knows exactly what products will be successful.

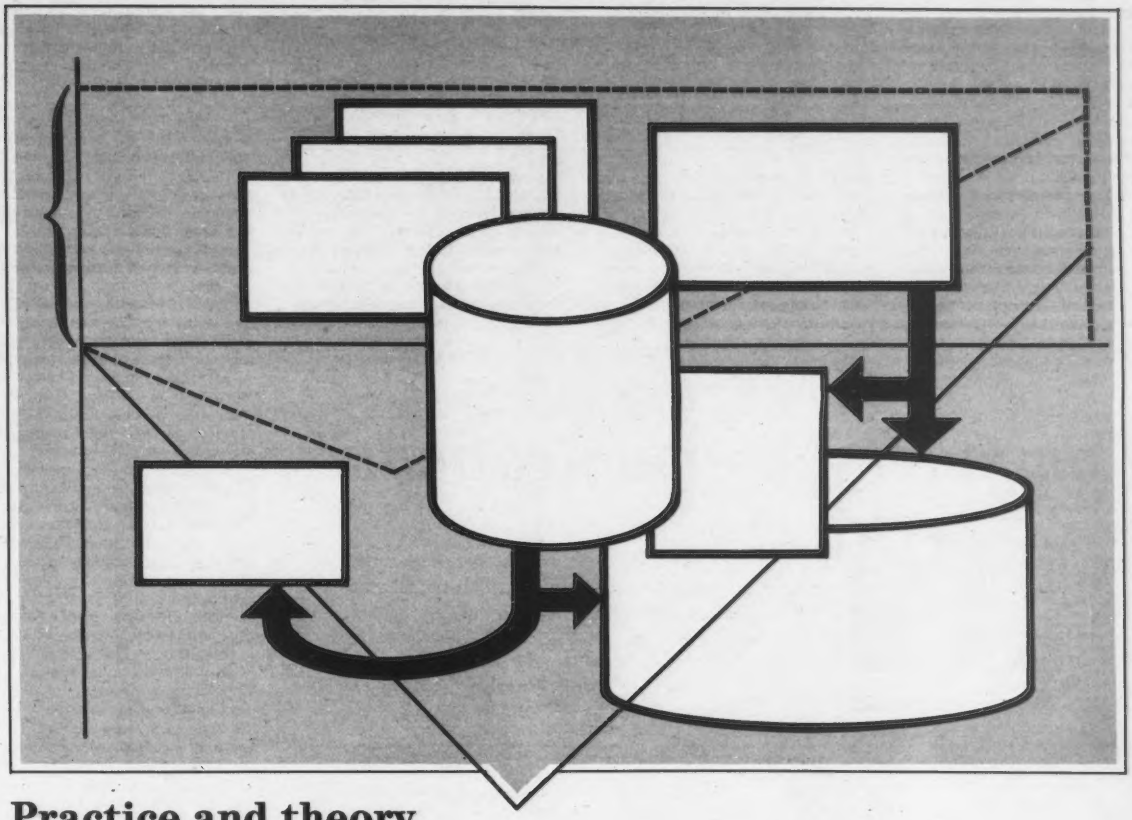
You need to tie in to a personal computer down the line?

Well, we already do. We can connect personal computers to our machine. It's not just connecting them, it's coexistence in that environment. It's clear that personal computers are going to replace terminals. It's clear that local networks are going to come into all of these places. What's not clear is who is going to make the terminal, who's going to make the network, who's going to install them and what people are going to use them for, because they're using these devices for applications we never anticipated.

What exactly is your competition?

IBM, IBM, IBM. We compete with the IBM 4300, the IBM System/38, the IBM Personal Computer, the IBM System/36 and so forth. But the major competitor is conceptual, not really a product. A certain number of people remain committed to centralized data processing. If someone is emotionally and philosophically committed to centralized data processing, then we can't sell them a distributed processor. But if people need IBM-compatible distributed processors, we have a great business.

IN DEPTH



Practice and theory

How relational systems perform

Contrary to popular belief, relational DBMS can perform at least as well as, and quite possibly better than, older hierarchical or network systems. One of the developers of relational theory and practice explains why.

By C.J. Date

Misconceptions have grown up in the DP world these past few years about relational systems, and many of these misconceptions relate to performance. Two commonly heard opinions are:

"Relational systems are all very fine for ad hoc query, but they will never achieve the performance needed for production systems (or transaction processing systems or . . .)"

"Relational systems require a breakthrough in hardware technology such as associative memory before they will be able to achieve acceptable performance."

The contrasting opinion (and mine, needless to say) is:

"There is no intrinsic reason why a relational system should perform any worse than any other kind of system."

Ignoring, for the moment, the interference effects introduced when multiple transactions are run in parallel, we can concentrate on the performance of some given data base transaction considered in isolation. The two principal factors determining the performance of such a transaction are, of course, the number of I/O operations and the pathlength (amount of CPU processing).

Pathlength. The IBM products DB2 and Structured Query Language/Data System (SQL/DS) are *compiling systems*: User-level data base statements are compiled prior to run time into appropriate machine code instructions. Most other systems, relational or otherwise, are interpretive. But the advantages of compilation are widely recognized, and several other relational systems — for example, Oracle Corp.'s Oracle and Relational Technology, Inc.'s Ingres — are moving totally or partially to the compiling approach.

In this discussion, let us concentrate on compiling systems. The purpose of compiling is, precisely, to reduce the runtime pathlength. To be specific, all of the following operations are removed from the runtime path:

- Parsing the original user request.
- Detecting and reporting on syntax errors.
- Mapping logical-level names to physical-level addresses.

- Choosing an access strategy.
- Checking authorization.
- Generating machine code.

Of these operations, easily the most significant from the performance standpoint is choosing an access strategy — in a word, optimization. The runtime pathlength is, thus, considerably shorter than it would be otherwise. What is more, the generated code is tailored to the original request and may be more efficient than more generalized, interpretive code.

Moreover, the performance benefits of compilation can be achieved without any corresponding loss of flexibility in operation. If recompilation becomes necessary (for example, if an index is dropped), the system can perform that recompilation automatically, thanks to an ingenious technique now known as "automatic bind," which was pioneered in the IBM research prototype System R.

The field of data base optimization today may be likened to the field of programming language optimization as it was some 15 or 20 years ago. Researchers are investigating the problem at universities and elsewhere, and the fruits of their work will no doubt eventually find their way into implemented products.

Note, incidentally, that compilation in the above sense (that is, *optimized* compilation) would not even be feasible in a record-level system, because the system would not be able to capture the user's intent in the same way. Thus, it is conceivable a relational system may ultimately involve *shorter* pathlengths than a nonrelational system (if, for example, the nonrelational system always has to parse requests at runtime).

I/O operations. The number of I/O operations required to satisfy a particular request is a function of the *physical* structure of the data base, not the logical structure; it has nothing to do with how the data base is perceived by its users, that is, as relations or as some other logical structure. (Of course, we are assuming here that the system does make a genuine distinction between the physical and logical levels, as a relational system does.) The question of how much I/O is needed in a relational system can, therefore, be broken down into two subsidiary questions:

1. Are the physical structures supported by the system capable of providing the kind of I/O performance needed?

2. If the answer to the first question is yes, then is the system capable of accepting high-level, relational requests (for example, a SQL SELECT statement or a QUEL RETRIEVE statement) and converting them into operations on those physical structures that are "as good as hand code" — as good as the code that would be produced by a skilled programmer working directly at the physical level?

Regarding the first question, most relational systems today support B-tree indexes. A few systems also support hashes and so on (for example, Ingres does), but B-trees are far and away the structure most often encountered in practice. In fact, there is little doubt that if a single physical structure has to be chosen, B-trees are the obvious choice.

Now, B-trees are certainly capable of providing adequate performance for many applications (this statement must be true, or nobody would use Vsam). On the other hand, some applications simply must use hashing to meet their performance requirements. Thus, the answer to the first question in most current systems is yes if indexes are acceptable for the application in hand; otherwise, no. (In the latter case, of course, the answer may still be yes for some other system.)

Assuming that the answer to the first question is yes, let us now consider the second: Can the system produce code that is as good as hand code? The short answer is yes, it can (in many cases, but not all). The function of the system optimizer is precisely to convert user-level statements into optimized machine code — where "optimized" means, basically, that the generated code employs the best strategy it can for satisfying the original request. In

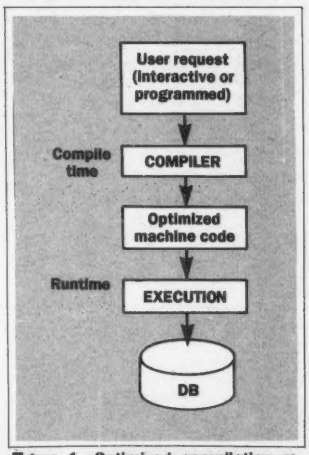


Figure 1. Optimized compilation reduces the runtime pathlength.

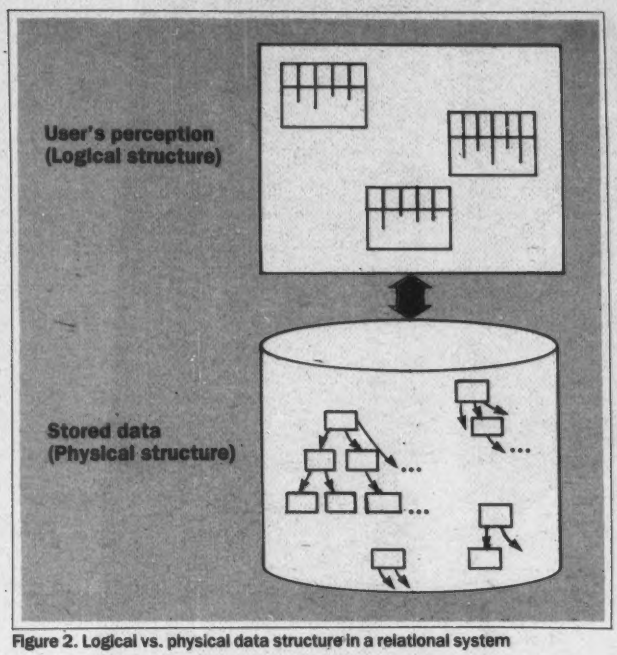


Figure 2. Logical vs. physical data structure in a relational system

DB2, for example, the optimizer will always try to make use of a "clustering index" if one exists that matches the requirements of the user-level statement. Of course, the optimizer does not produce the best possible code for every possible request, but then, neither do most human programmers.

Note, moreover, that we are talking here about products that are, for the most part, only at the stage of a first or second release — products, what is more, that are based on a brand new technology. It is reasonable to expect continuing improvements in the area of optimization throughout the lifetime of those products. Indeed, the field of data base optimization today may be likened to the field of programming language optimization as it was some 15 or 20 years ago. Researchers are investigating the problem at universities and elsewhere, and the fruits of their work will no doubt eventually find their way into implemented products.

Moreover, such enhancements can be made without in any way affecting the form of the external interface (that is what data independence is all about).

As a matter of fact, it is even conceivable that the optimizer might produce code that is *better* than hand code. It may well be the case that the optimizer has information available to it (regarding, for example, physical data clustering, table sizes and index selectivities) that a hand coder typically would not have. Moreover, that information may change with time. If it does, reoptimization may become necessary. Such reoptimization is trivial in a relational system; it simply involves a recompile and quite possibly an automatic one at that. It would be very difficult in a hand-coding system, requiring a program rewrite.

One final point regarding optimization: Relational systems may, in some cases, outperform nonrelational systems for another reason. The point is precisely that those relational systems are optimizing systems. High-level relational operations are optimizable precisely because they are high-level — they carry much semantic content, and the optimizer is, therefore, able to recognize what the user is trying to do and can respond in an optimal way.

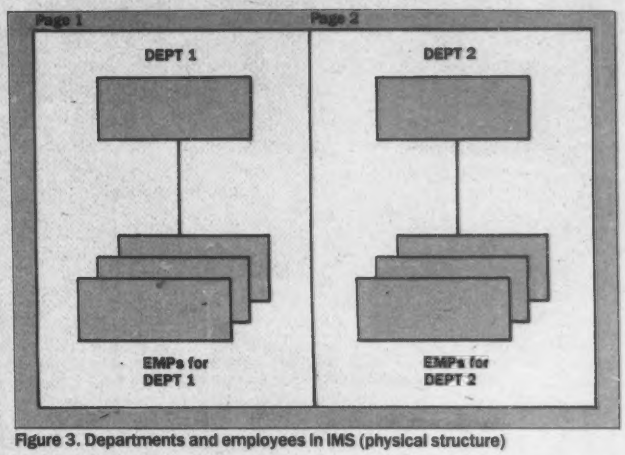


Figure 3. Departments and employees in IMS (physical structure)

By contrast, in a nonrelational system, in which the user operates at the record level instead of the set level, access strategies are chosen by the user; and if the user makes a wrong choice, there is little chance that the system will be able to optimize that user's code.

As an example, suppose the (nonrelational) user is trying to compute the join of tables A and B. There are two possible strategies: 1) For each record of A in turn, find all matching records in B; 2) for each record of B in turn, find all matching records in A. Depending on such considerations as the relative sizes of A and B and (especially) their physical clustering characteristics, one of these strategies is likely to outperform the other by several orders of magnitude. And, as stated previously, if the user chooses the wrong one, there is really no way that the system can convert it into the other, because the user's choice is expressed as a sequence of low-level operations

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It is sometimes suggested that a relational system must perform poorly *as a system* regardless of its efficiency with respect to any individual transaction (see, for example, "What Price Relational?" by William H. Inmon, *Computerworld*, Nov. 28, 1983). The argument is that relational systems will be running a mixture of planned transactions and ad hoc queries (short-running activities and long-running activities, to use Inmon's terminology) and that those two kinds of activity are mutually disruptive.

Now, it is true for any system (not just a relational one) that these two kinds of activity tend to interfere with each other somewhat, and there is no harm in drawing attention to that fact. But to suggest that relational systems will, therefore, have significantly worse performance than less flexible (hierarchical or network) systems is completely unwarranted, for at least two reasons:

- First, the comparison is apples to oranges. It is extremely difficult to perform any kind of ad hoc activity at all on hierarchical and network data bases, with the result that those systems are almost invariably (de facto) devoted to planned activities. This fact does not mean that users would not like to be able to perform ad hoc access to those data bases if they could.
- Second, there is no *requirement* to mix the two kinds of activity in a relational system. It is ridiculous to suggest, as Inmon did, that controls cannot be imposed in the relational environment. Of course they can, if the installation requires them. The authorization subsystem — which tends to be much more sophisticated in relational than in nonrelational systems, incidentally — provides an obvious example (not the only one) of an appropriate control mechanism. In Ingres, it is perfectly feasible to restrict ad hoc queries to specified hours of the day and/or days of the week.

Moreover, even if such controls do prove necessary in some installations, the user will still enjoy all the other advantages of relational technology (ease of use, speed of application development, resilience to change and so on) and, in addition, will be able to perform ad hoc access at controlled times. Furthermore, at many installations such controls will not be necessary, because the overall performance requirements will be less stringent. Balancing the requirement for ad hoc data availability vs. the control needed to guarantee specific levels of performance is a trade-off like any other.

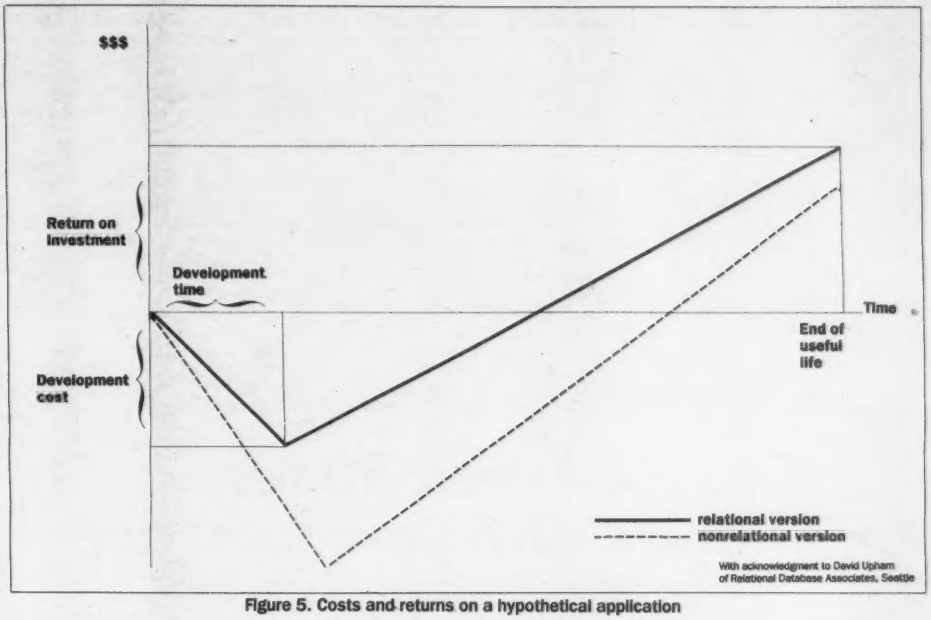


Figure 5. Costs and returns on a hypothetical application

DB2 vs. IMS

I conclude that there is absolutely no reason a relational system that is implemented on perfectly conventional hardware using perfectly conventional software techniques should not perform perfectly well. A hardware breakthrough is not required (though if, for example, cheap large-capacity associative memory ever did become a commercial reality, it would certainly be easier to take advantage of it in a relational system than in a nonrelational one).

Of course, I should emphasize that the foregoing discussions are all very general. I am not saying that a system like DB2 today is able to perform as well as a long-established system such as IMS. In the case of DB2 in particular, it is probably too early even to give any kind of performance figures, though it is a safe bet that any such figures would be substantially less attractive than the corresponding figures for IMS. There is little doubt that *for a given application*, where the data structures and the transaction patterns are very well understood ahead of time, an established system like IMS can be customized and configured to produce more impressive performance than a system like DB2 can — today. On the other hand:

1. That customized system may not look so impressive when other

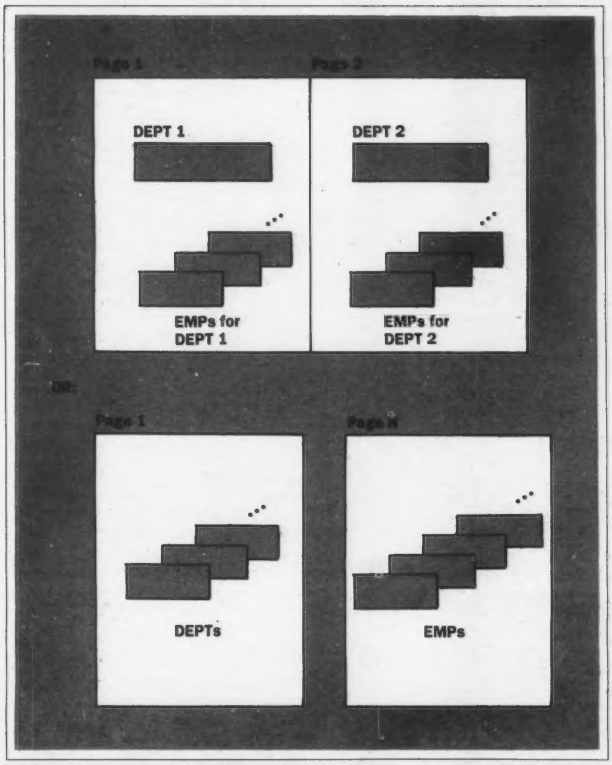


Figure 4. Departments, employees in a relational system (physical structure)

applications are added to it. Implementing application B on a system that is customized to application A is like cutting wood against the grain — extraneous considerations keep getting in the way. And note that these comments apply not only to system performance but also to the logical structure of the system as perceived by the user (that is, application B will probably be more awkward to write as well).

Logical data structures in a nonrelational system tend to be biased toward some applications and against others, precisely because they closely reflect the physical data structure. Logical data structures in a relational system, by contrast, are more neutral: The application bias shows not in the logical data structure but in the manipulative operations, which by definition are far more flexible than the comparatively static data structure. (The bias will, of course, also show in the physical data structure.)

2. To amplify on the first point: Consider the standard departments-and-employees data base, and consider two typical transactions: (T1) find a specified department and all of its employees; (T2) find all departments. In IMS, the data would typically be organized as a two-level hierarchy, with, for example, index access to departments and pointer access from each department to its employees. This arrangement gives good performance for transaction T1 but bad performance for transaction T2. In a relational system, the data could be physically arranged either as in IMS or, perhaps more usually, as two physically separate sets of records, each with a corresponding index. The first of these arrangements would give essentially the same performance as IMS for both T1 and T2; the second would give somewhat worse performance than IMS for T1 (typically four I/O operations instead of two) but much better performance than IMS for T2 (N times fewer I/O operations, where N is the number of records per page).

3. One reason for the performance advantage of nonrelational systems is simply that those systems have been running for 10 or 15 years and have been constantly improved and tuned throughout that time. Relational systems will improve, too, over the next few years. Moreover, it is not clear that further significant improvements are even possible in a nonrelational system, whereas the field is wide open for such improvements in the relational case.

4. Even if the nonrelational system provides superior runtime performance, the value of that benefit has to be balanced against the amount of time it takes to get the system operational in the first place (not to mention the amount of time spent in subsequent maintenance). The installation's investment will be recovered more quickly with a relational system than with a nonrelational one, because applications will be running sooner. The ultimate return on investment may be higher, too, if the application lifetime is less than the time it takes for the nonrelational version to "catch up," economically speaking, with the relational one.

But let me repeat that all of the above is somewhat theoretical. As stated earlier, a system like DB2 today is extremely unlikely to achieve the performance level of a system like IMS today. The trade-off that must be considered today is performance vs. usability — or, to put it another way, machine productivity vs. people productivity.

Now, it is a truism that people costs are rising fast and machine costs are falling, also fast. As a result, people productivity is very rapidly becoming the dominating factor in many applications; in many cases, it already is. For such applications, relational systems are obviously ideally suited, even at their present level of performance.

However, there are also many applications in which raw machine performance is still the overriding concern. Thus, systems like IMS will have a major role to play for several years to come. And even if relational systems do eventually achieve parity in performance (as I, for one, am convinced they will), the huge investment in nonrelational systems is sufficient to ensure the continued existence of those systems for the foreseeable future.

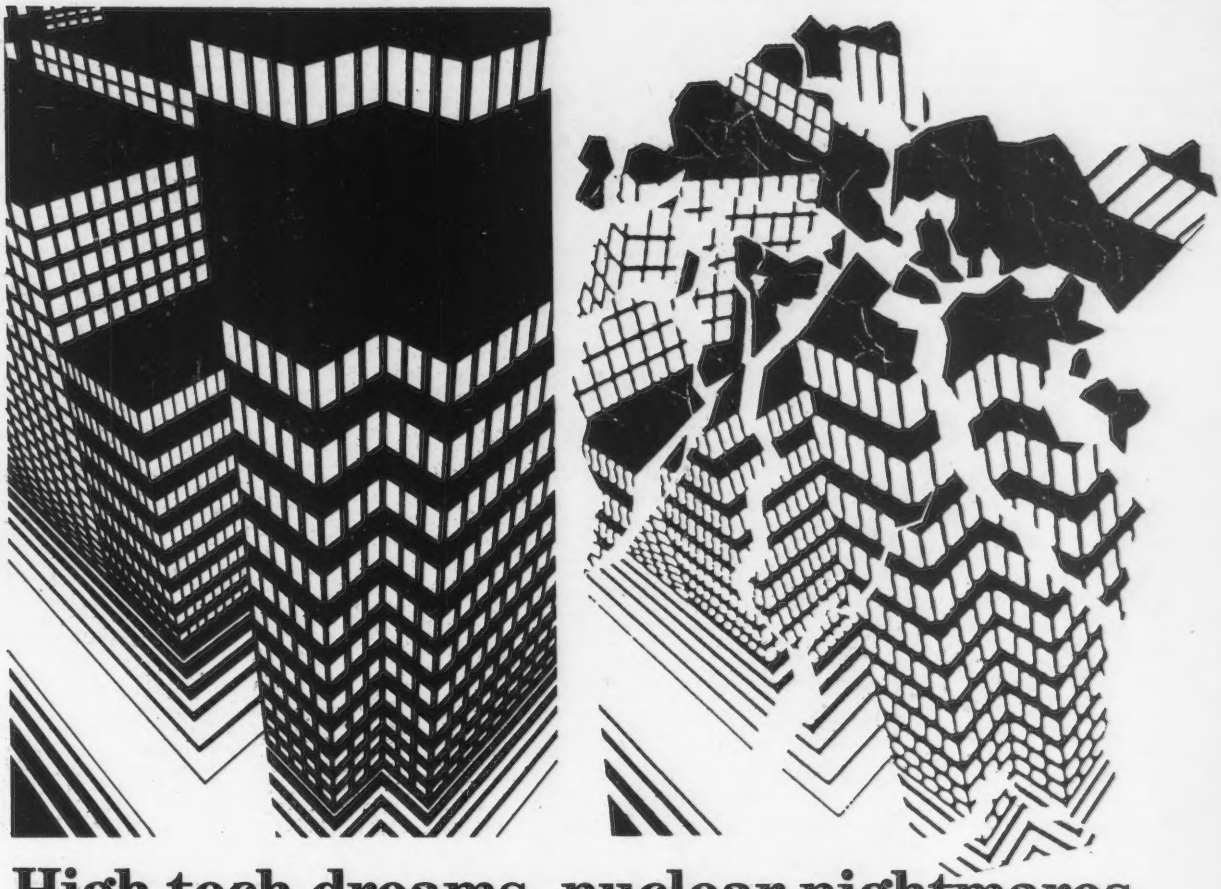
Human beings are notoriously reluctant to expend the effort needed to learn something new, even when the advantages of doing so are obvious. Witness the fact that, even today, some applications are still written in assembler language instead of in Cobol or some still higher level language. This reluctance is one reason why IBM views DB2 — at least for now — as complementing IMS, not replacing it, and designed the two products to work in harmony as a single cooperating system.

About the author

C.J. Date is an independent author, lecturer and consultant who specializes in relational data base systems. He is based in Saratoga, Calif. In 1967, Date joined IBM in England, where he worked on the integration of data base functions into PL/I. In 1974, he moved to the IBM Development Center in California, where he was responsible for the design of Unified Database Language (UDL). More recently, he was involved in technical planning and externals design for the IBM relational products SQL/DS (announced in 1981 for DOS and in 1983 for VM) and DB2 (announced in 1983 for MVS). He left IBM in May 1983.

This article is based in part on material from Date's book, A Guide to DB2, *to be published by Addison-Wesley this year.*

IN DEPTH



High-tech dreams, nuclear nightmares

Some in the ranks of data processing are challenging the unrestrained application of high technology to military purposes. Though still an apparent minority, they are organizing and questioning: What is the responsibility of the technical community in the nuclear age?

By Mark Hall

Dave Caulkins left his job with the Pentagon's Minuteman missile program "for moral reasons." With John Larson, a programmer for Xerox Corp., he established a computer conferencing system in Palo Alto, Calif., to foster discussion about arms control and disarmament among programmers, computer scientists and engineers.

Consultant Arthur Fink founded the Center for Appropriate Computing in Wilton, N.H., to encourage debate among "those who use or are touched by computer technology." Typical workshops: "The Computer and Personal Values" and "Computers and Religious Values." Fink says, "We should all affirm that we face ethical questions in our industry."

High Technology Professionals for Peace (HTPFP) opened an employment agency in Boston two years ago dedicated to finding nonmilitary-related jobs for anyone in the computer, engineering or scientific fields.

"The technical community has a particular responsibility to interpret the technical information presented to the general public by government, the weapons laboratories and certain research organizations," says Josie Stein, an HTPFP board member. "For example, the Heritage Foundation did a so-called 'scientific study' claiming we need 400 space-based battlestations to defend against ICBMs. That's technical nonsense. And it is the technical community's responsibility to explain the physics, mathematics and engineering principles that make it nonsense."

Isn't state-of-the-art military technology secret and, therefore, not explainable to the public? Stein replies: "The laws of physics are not classified."

Some of the designers, programmers and builders of the most destructive weapons systems ever conceived are now rebelling against their own designs, looking beyond the cleverness of the technology and considering its repercussions. Does the development and deployment of a computer-reliant defense, in fact, give the superpowers less control over the instruments of peace and war?

"Technologists," says Lucy Suchman,

co-director of the Palo Alto chapter of Computer Professionals for Social Responsibility (CPSR), "have an obligation to be as clear and honest as possible about the capabilities of technology and the choices available."

As Fink points out, "Just because a particular technology works does not mean it should be applied."

Joel Yudken of the Mid-Peninsula Conversion Project, a Silicon Valley organization dedicated to finding nonwar-products work for technologists, states that in the U.S., one-third to one-half of all scientists and engineers are employed in military-related programs. He says the Pentagon's demand for engineers in California alone will outstrip the state's ability to graduate them.

William Cutler, a systems engineer with Lockheed Missiles & Space, Inc. in Sunnyvale, Calif., observes that sometimes military programs "dry up" civilian projects and force technologists within a company a transfer to jobs that "may offend an individual's ethics," raising the basic dichotomy of choosing between one's personal beliefs or familial and economic responsibilities.

Beyond the morality of working on nuclear weapons systems, technologists are beginning to question the validity and capability of the technology itself. Dr. Severo Ornstein, a computer scientist with Xerox's research center in Palo Alto, points out that as defense systems increase in complexity, they require more computer processing. "Larger and larger pieces of the decision-making apparatus get turned over to computer systems. The more one turns over to machines, the more one becomes vulnerable to their fallibility."

The primary concern is the role of technology in the world's nuclear arsenals. Nobel Prize Laureate Owen Chamberlain says of his role in the Manhattan Project, "It seemed like a right thing at the time." Some in the technological community today are realizing that being part of developing powerful weapons means they may forever "be known as those that prepared the world for the great catastrophe."

The fact that those who lead the military even consider nuclear weapons in their war scenarios today appalls Chamberlain. It is equally disturbing to him and others that scientists and engineers persist in designing products that fit the war planners' imaginations. Dr. Oak Knoll, a theoretical chemist formerly with the Los Alamos and Sandia weapons laboratories, believes that scientists delude themselves by proclaiming their research "neutral." "That way they don't have to confront the difficult question of morality," he says. "They believe that they are not responsible for its application."

As one of the founders of CPSR, Ornstein represents increasing discontent among the nation's technologists and scientists. "When I got concerned about my children and my grandchildren, not to mention me, and when I believed genuinely that our lives were in jeopardy, I thought that I should do whatever I possibly could by whatever means were at my disposal."

Although CPSR is a young organization (begun in the summer of 1982 and granted nonprofit status the next spring), it has 400 members in Boston, Seattle, Madison (Wis.), Los Angeles, Berkeley, Palo Alto, San Jose, Santa Cruz (Calif.) and New York chapters. It sponsors forums and provides speakers on the technical issues surrounding nuclear weapons. The group was represented at the International Joint Conference on Artificial Intelligence and has been invited to the Association for Computing Machinery's annual conference. Among the more well-known members are Joseph Weizenbaum of MIT and Terry Winograd of Stanford University and the Xerox Palo Alto Research Center.

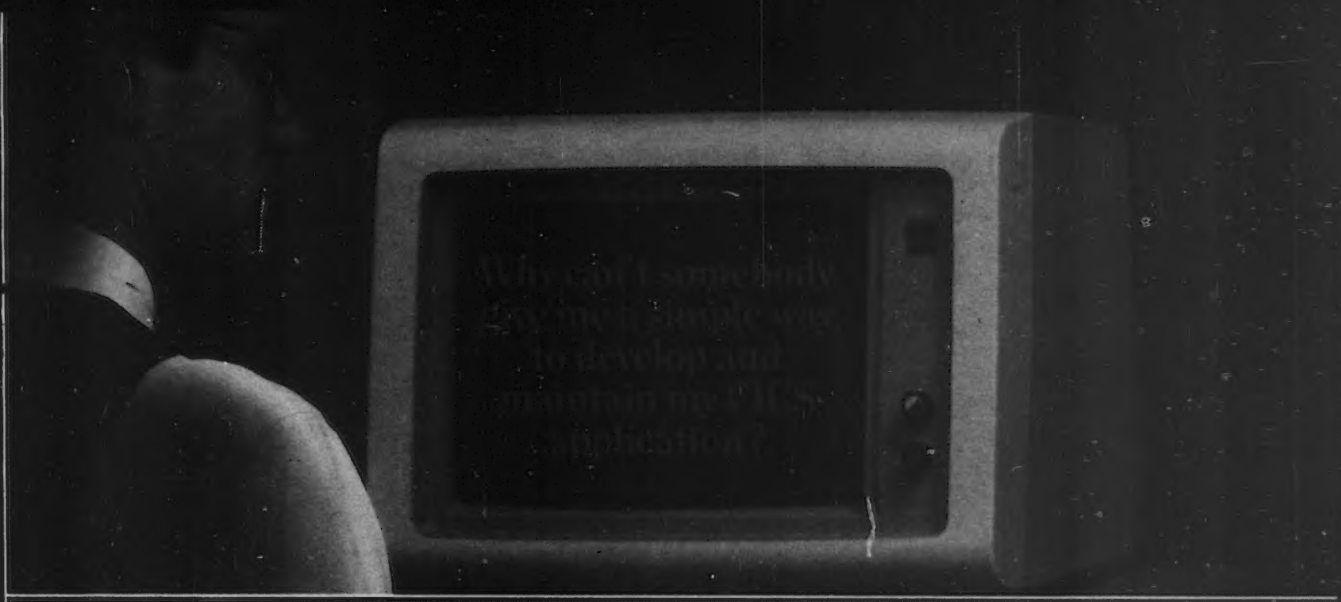
CPSR is among a number of growing organizations claiming to represent the social concerns of technologists and scientists. High Technology Professionals for Peace, founded in 1981, recently opened a Boston office for its 200-member organization. Fink's Center for Appropriate Computing and Yudkin's Mid-Penninsula Conversion Project are also less than two years old.

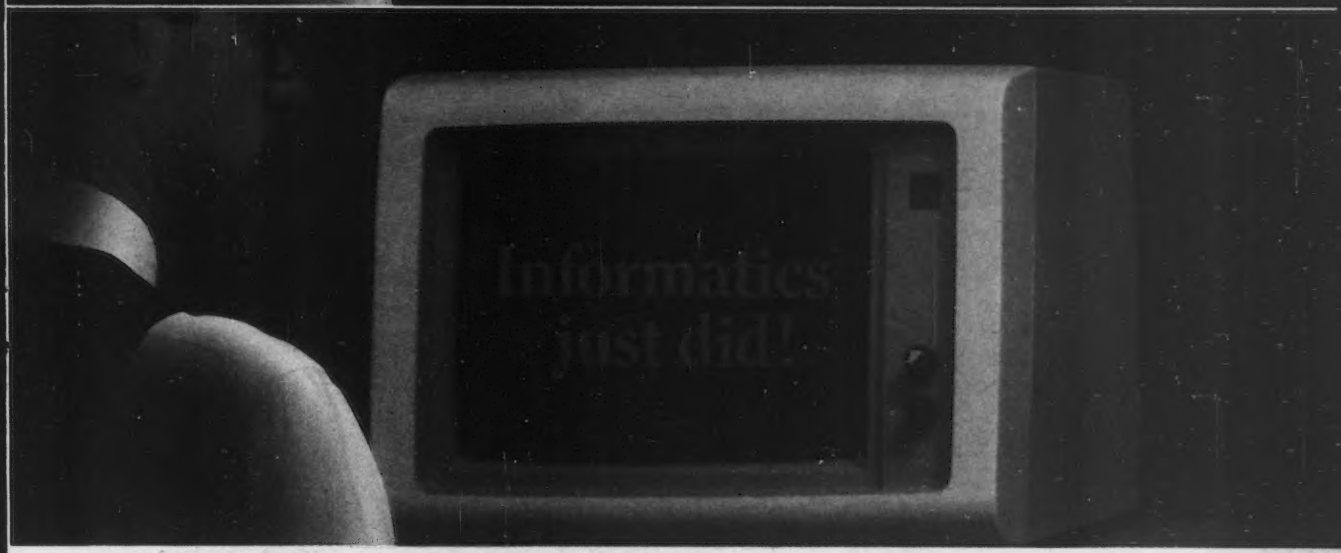
Of course, groups like The Union of Concerned Scientists have been prodding the consciences of scientists for decades. Individuals with no less stature than Albert Einstein have called on their peers to re-evaluate their work from a moral, rather than merely a scientific, perspective. Today, the Pentagon's widening impact on the research and development community has spurred new levels of anxiety among high-tech

To get in touch

Further information on the organizations discussed here is available from:

- Center for Appropriate Computing, Box 614, Prince St., Wilton, N.H. 03086.
- Computer Professionals for Social Responsibility, P.O. Box 717, Palo Alto, Calif. 94301.
- High-Technology Professionals for Peace, Suite 316, 639 Massachusetts Ave., Cambridge, Mass. 02139.
- Mid-Peninsula Conversion Project, 222 View St., Mountain View, Calif. 94041.
- The Technology and Society Committee, P.O. Box 1526, Mountain View, Calif. 94042.
- Union of Concerned Scientists, 1384 Massachusetts Ave., Cambridge, Mass. 02238.





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professionals.

According to Alex Brown, co-founder of HTPFP, "It is all too easy to accept uncritically the traditional arguments about military R&D that conceal its nature: That U.S. military R&D is a direct response to foreign R&D challenges, that military R&D serves the security needs of the American people and that it does, indeed, increase the stability of world order. All [those arguments] are false and must be discarded before a realistic route toward a safe world can be planned."

Dr. Jack Jennings, a senior systems engineer with TRW, says that working on the tools of war is "a waste of time, talent and resources." He believes there exists a "mechanism geared within the system to destroy society and mankind as a species" and that it may be impossible to stop.

Dr. Hugh DeWitt, a Lawrence Livermore Laboratories physicist, sees institutions that provide technological know-how for the military, such as his own employer, as "isolated from the rest of the scientific community, from the rest of American society."

Conspiracy of silence

As Jennings points out, technologists and scientists generally like "to have fun learning something new," which is what attracts them to the well-funded weapons labs and weapons contractors. But there they often become isolated from the political and social questions raised by their work. Prof. Bernard Roth of the Stanford Mechanical Engineering School sees "a conspiracy of silence within the technical community."

Limiting the free exchange of knowledge, Chamberlain believes, contributes to the possibilities of nuclear annihilation. He also worries about the "revival of McCarthyism" in the scientific community. He describes as a devastating move the Reagan administration's executive order forcing the review of writings by individuals who may have worked on classified projects. In the scientific community, publication is the ultimate criterion for recognition and success.

Chamberlain believes that beyond creating a central clearinghouse controlled by bureaucrats and not peers, the policy will have a dramatic impact on scientific and technical achievements in the U.S. Scientists might reconsider the attractiveness of working within an industry that constrains individual rights and possible career advancement.

The primary fear, however, remains that the technological designs scientists dreamed and executed now hold mankind by the throat. Weapons systems now seem to surpass rational man's ability to manipulate them. Trident, Pershing II and MX missile systems are the most flamboyant execution of high technology.

Brian Smith, president of CPSR, says that these weapons "may force the Soviets to implement a 'launch-on-warning' program because the weapons can reach their targets quickly and with pinpoint accuracy. Computers become the sole interface between the decision to launch a nuclear arsenal or to hold the bombs in check, since only computers could possibly detect an attack and retaliate in time."

Technologists employed at the well-funded weapons labs often become isolated from the political and social questions raised by their work.

Ornstein says it is "not our reliance on computers that scares me nearly as much as the Russians' reliance on computers." Even if U.S. war technology operates as designed with all possible safeguards against accidental launch, those at whom the weapons are directed are compelled to respond — with systems that may be archaic and inadequate.

Doubts about performance

There are also lingering doubts about our dependence on high-tech defense. Skepticism abounds within engineering and scientific journals about the performance of "ultimate defense weapons."

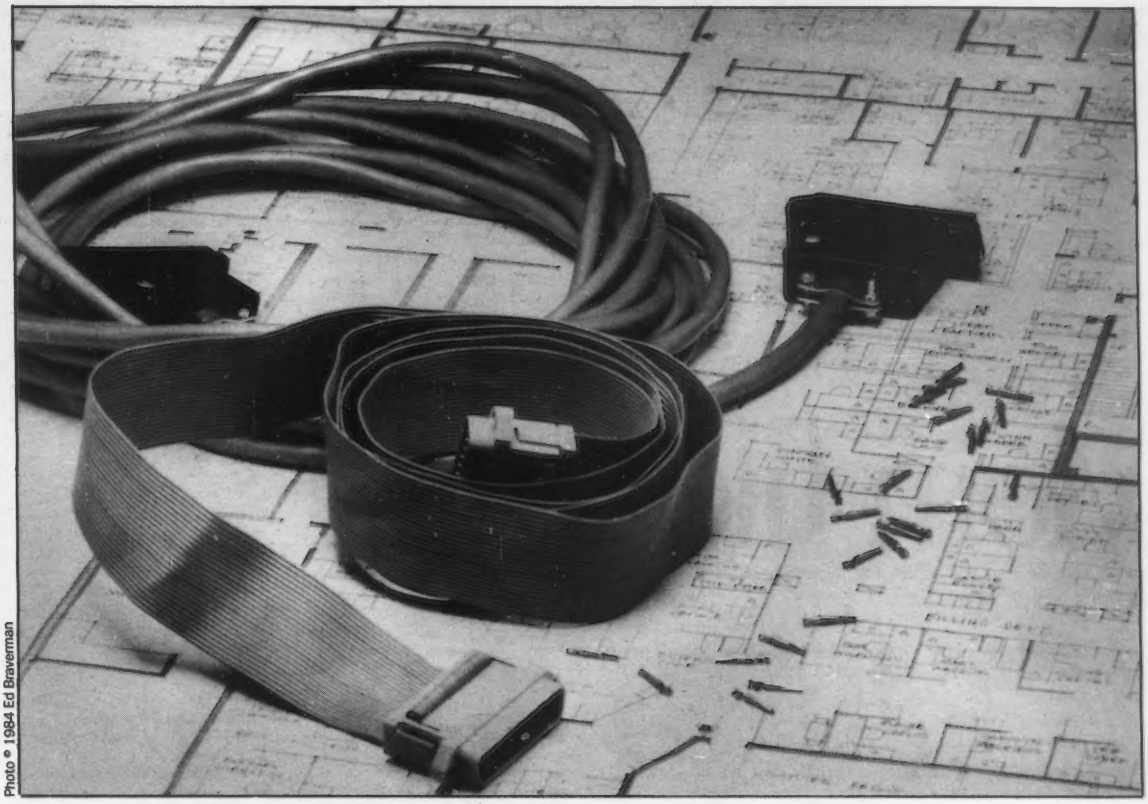
Fred Kaplan wrote in *High Technology* magazine that experts believed the Tomahawk Cruise missile was "a dud, a high-technology application of questionable military value." The Harvard Study Group concluded, "The arms race in recent years has been not in numbers, but in technological improvements." Its report, *Living With Nuclear Weapons*, published by Harvard University Press, exposes the limitations of technology as being more dangerous than the capabilities. And yet arms agreements are predicated upon the capabilities.

As Desmond Ball pointed out in his article for the International Institute of Strategic Studies, the most sophisticated nuclear war-fighting capability may, in fact, "be impossible to realize." Yet publicized capabilities of the U.S. could frighten the Soviets into a pre-emptive strike. High-tech weapons could turn out to be a gossamer Maginot Line made of blueprints and scientific ideas that never could work in the real world.

About the author

Mark Hall is the technical editor for Micro Communications, *a monthly magazine based in San Francisco. He has contributed to a number of technical publications as well as historical academic journals.*

IN DEPTH



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IEEE Project 802

Setting standards for local-area networks

By William Stallings

Development of the local-area network market depends on the availability of a low-cost interface. The cost to connect equipment to a local network must be much less than the cost of the equipment alone. This requirement as well as the complexity of the local-area network protocols dictate a very large-scale integration (VLSI) solution.

Chip manufacturers will be reluctant to commit the necessary resources without a high-volume market. A local-area network standard would ensure volume and also enable communication among equipment from a variety of manufacturers.

The Institute of Electrical and Electronics Engineers Computer Society established IEEE Project 802 in February 1980 to draft a local-area network standard. The work of the 802 committee has now come to fruition. Several parts of the proposal are now working their way through national and international standards organizations, and the remainder will follow soon.

The task of IEEE 802 was to specify the means by which devices could communicate over a local network. The committee characterized its work as follows:

"A local network is a data communications system that allows a number of independent devices to communicate with each other. This standard defines a set of interfaces and protocols for the local network.

"A local network is distinguished from other types of data networks in that the communication is usually confined to a moderate-size geographic area such as a single office building, a warehouse or a campus. The network can generally depend on a communications channel of moderate to high data rate which has a consistently low error rate. The network is generally owned and used by a single organization, in contrast to long-distance networks which interconnect facilities in different parts of the country or are used as a public utility. The local-area network is also different from networks

The objective of the local-area network standard is to ensure compatibility between equipment made by different manufacturers. The world of local networks will rapidly become an IEEE 802 world. As IEEE 802 products become widely available, nonstandard offerings can be expected to wither away — with two exceptions.

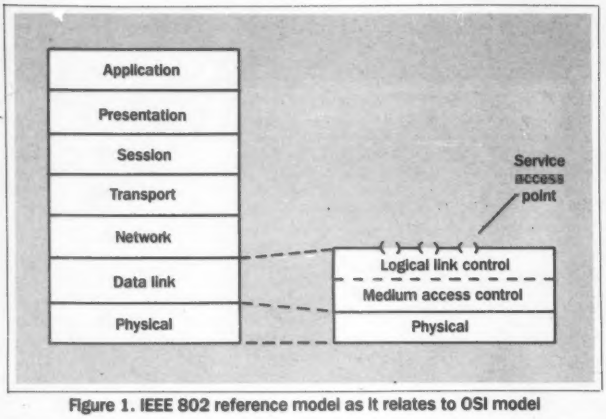

Figure 1. IEEE 802 reference model as it relates to OSI model

that interconnect devices on a desktop or components within a single piece of equipment.

"The objective of the local network standard is to ensure compatibility between equipment made by different manufacturers such that data communications can take place between the devices with a minimum effort on the part of the equipment users or the builders of a system containing the equipment. To accomplish this, the standard will provide specifications that establish common interfaces and protocols for local-area data communications networks."

The committee quickly reached two conclusions. First, the task of communicating across a local network is sufficiently complex that it needs to be broken up into more manageable subtasks. And second, no single technical approach will satisfy all requirements.

The first conclusion is reflected in a "local network reference model," compared in Figure 1 to the better-known open systems interconnection (OSI) model. The local network reference model has three layers:

Physical: This layer is concerned with the nature of the transmission medium and the details of device attachment and electrical signaling.

Medium access control: A local network is characterized by a collection of devices all needing to share a single transmission medium. A means to control access is needed so that only one device attempts to transmit at a time.

Logical link control: This layer is concerned with establishing, maintaining and terminating a logical link between devices.

The committee reluctantly reached the second conclusion when it became apparent that no single standard would satisfy all participants. There was support for both ring and bus topologies. Within the bus topology, there was support for two access methods (carrier-sense multiple access with collision detection [CSMA/CD] and token bus) and two media (baseband and broadband). The response of the committee was to standardize all serious proposals rather than to try to settle on just one. The result is shown in Figure 2.

The work of the IEEE 802 committee is currently organized into the following subcommittees:

- IEEE 802.1 Higher Layer Interface Standard.
- IEEE 802.2 Logical Link Control Standard (LLC).
- IEEE 802.3 CSMA/CD.
- IEEE 802.4 Token Bus.
- IEEE 802.5 Token Ring.
- IEEE 802.6 Metropolitan Area Network (MAN).

The Higher Layer Interface subcommittee is not developing standards, but rather is working on a variety of related issues such as higher layer interfaces, internetworking, addressing and network management.

Work has been completed on LLC, CSMA/CD and token bus for an initial standard. All three are now approved IEEE standards (IEEE Std. 802.2-1983, 802.3-1983 and 802.4-1983 respectively). Work continues on token ring within IEEE 802, with the intention of passing it to the IEEE Standards Board by the middle of this year.

The work on metropolitan area networks has as yet made little progress. The subcommittee is attempting to develop a small number of reasonable alternatives for further study.

The acceptance of the IEEE 802 standards has been remarkably widespread. The National Bureau of Standards, which issues Federal Information Processing Standards (Fips) for U.S. government procurements, has announced the intention of issuing Fips for CSMA/CD and LLC. The others will probably follow. The International Standards Organization (ISO) has decided to adopt the IEEE 802 documents in toto as Draft Proposed Standards. This is the first step in the development of international standards. The influential European Computer Manufacturers Association (Ecma), which had been actively drafting its own local-

area network standards, has now officially deferred to IEEE 802.

The marketplace

The acceptance of the IEEE 802 standards in the marketplace is assured. As the preceding discussion suggests, the work of the IEEE 802 committee has no competition for standardization. The standards are being adopted within the U.S. and internationally.

Vendors, too, are lining up behind the standard. Fortunately, the CSMA/CD baseband standard is virtually identical to the Ethernet specification. Thus, many Ethernet vendors have announced IEEE 802.3 products and a number of semiconductor houses have announced IEEE 802.3 chips. Token bus broadband is about to follow the same pattern. At least one local-area network vendor (Concord Data Systems) has announced an IEEE 802.4 product. The token ring standard has yet to blossom, but the expected announcement of an IEEE 802.5 product by IBM would change the picture overnight.

What of nonstandard offerings? Many of these can be expected to wither away as the IEEE 802 products become widely available. Two exceptions are likely. The first is the low-cost, twisted-pair local network intended primarily for personal computers. The Corvus Systems, Inc. Omninet is the most prevalent example. Large numbers of these networks are already installed. With the possible exception of the twisted-pair ring, the IEEE 802 standards do not address this marketplace.

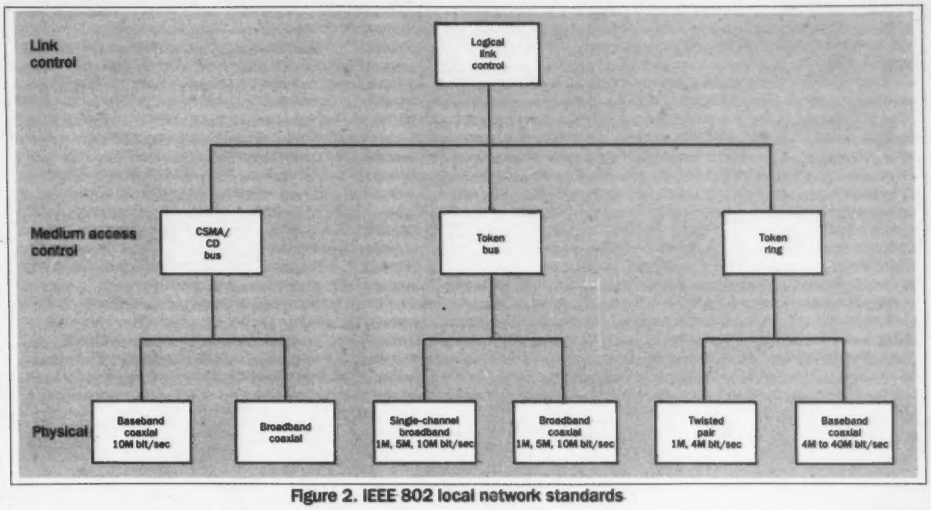

Figure 2. IEEE 802 local network standards

The second exception is from a company called AT&T, which will announce its own local network product shortly. The AT&T offering is totally distinct from all of the various IEEE 802 options and is based on a hybrid circuit and packet-switching technology.

With these exceptions, the world of local networks will rapidly become an IEEE 802 world.

Logical link control

The purpose of any data link control protocol is to provide a reliable communications path between two devices. Typically, data is transmitted in frames, which include control information for error control and flow control.

Because a local network consists of multiple, peer communications stations, the data link control requirement is more complex. The following functions are considered desirable:

Datagram: Some form of connectionless service is needed for efficient support of highly interactive traffic.

Virtual circuit: A connection-oriented service is also usually needed.

Multiplexing: Generally, a single physical link attaches a station to a local-area network; it should be possible to provide data transfer with multiple end points over that link.

Multicast, broadcast: The link layer should provide a service of sending a message to multiple stations or all stations.

Both the virtual circuit and multiplexing capabilities can be supported with the concept of the service access point (SAP). Figure 3 shows

Unacknowledged connectionless service
L-DATA.request
L-DATA.indication
Connection-oriented service
L-DATA-CONNECT.request
L-DATA-CONNECT.indication
L-DATA-CONNECT.confirm
L-CONNECT.request
L-CONNECT.indication
L-CONNECT.confirm
L-DISCONNECT.request
L-DISCONNECT.indication
L-DISCONNECT.confirm
L-RESET.request
L-RESET.indication
L-RESET.confirm
L-CONNECTION-FLOWCONTROL.request
L-CONNECTION-FLOWCONTROL.indication

Table 1. Logical link control primitives

three stations attached to a local network. Each station has an address.

Further, the link layer supports multiple SAPs, each with its own address. The link layer provides communications between SAPs.

Assume that a process or application X in station A wishes to send a message to a process in station C. X may be a report generator program in minicomputer A. C may be a printer and a simple printer driver. X attaches itself to SAP 1 and requests a connection to station C, SAP 1 (station C may have only one SAP if it is a single printer).

Station A's link layer then sends to the local-area network a "connection-request" frame, which ineludes the source address (A,1), the destination address (C,1) and some control bits indicating that this is a connection request.

The network delivers this frame to C, which, if it is free, returns a "connection-accepted" frame. Henceforth, all data from X will be assembled into a frame by A's LLC, which includes source (A,1) and destination (C,1) addresses.

Incoming frames addressed to (A,1) will be rejected unless they are from (C,1); these might be acknowledgment frames, for example. Similarly, station C's printer is declared busy, and C will only accept frames from (A,1).

Thus a connection-oriented service is provided. At the same time, process Y could attach to (A,2) and exchange data with (B,1). This is an example of multiplexing. In addition, various other processes in A could use (A,3) to send datagrams to various destinations.

IEEE 802 LLC specification

LLC provides two services:

Unacknowledged connectionless service: This is a datagram service that simply allows for sending and receiving frames. It supports point-to-point, multipoint and broadcast.

Connection-oriented service: This provides a virtual-circuit-style connection between service access points. It provides flow control, sequencing and error recovery.

These services are specified in terms of primitives that can be viewed as commands or procedure calls with parameters. Table 1 summarizes the LLC primitives.

The unacknowledged connectionless service provides for only two primitives across the interface between the next highest layer and LLC (not counting management service primitives). L-DATA.request is used to pass a frame to LLC for transmission. L-DATA.indication is used to pass a frame up from LLC upon reception.

The connection-oriented service includes L-DATA-CONNECT.request and L-DATA-CONNECT.indication, with meanings analogous to those above, plus L-DATA-CONNECT.confirm, which conveys the result (acknowledged, failure) of the previous associated L-DATA-CONNECT.request. In addition, a station, through an SAP, must be able to establish and tear down a connection and receive an acknowledgment of this action from the remote SAP. Finally, link resetting and flow control are provided.

The LLC frame consists of four fields, as shown in Figure 4. Unlike most link control formats, LLC requires both source and destination addresses to identify the two peer communicating entities. The source and destination are uniquely identified by a (node, SAP) pair. However, the node address is also used by MAC and is included in the outer MAC frame.

The LLC protocol is very similar to High-Level Data Link Control (HDLC). The format of the control field is identical to that of HDLC and the functioning is the same, with three exceptions:

- LLC makes use only of the asynchronous balanced mode of operation and does not employ HDLC's normal response mode or asynchronous response mode. This mode is used to support connection-oriented service. The set asynchronous balanced mode (SABM) command is used to establish a connection, and disconnect (DISC) is used to terminate the connection.
- LCC supports a connectionless (datagram) service by using the unnumbered information (UI) frame.
- LLC permits multiplexing by the use of SAPs.

CSMA/CD

The simplest form of medium access control adopted for IEEE 802 is CSMA/CD. This technique was popularized by Ethernet, which is a baseband local network developed in its original version by Xerox Corp. and then in its second version jointly by Xerox with Digital Equipment Corp. and Intel Corp. A broadband CSMA/CD was pioneered by Mitre Corp.

We begin by looking at a simpler version known as CSMA (carrier sense multiple access). With this

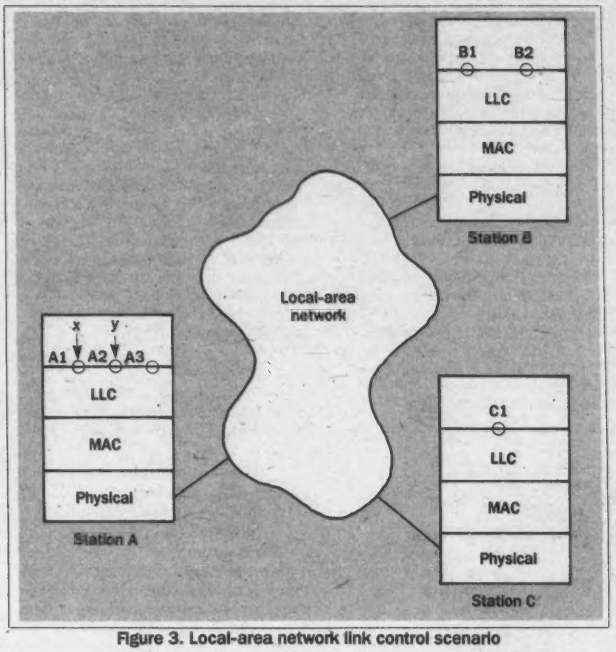

Figure 3. Local-area network link control scenario

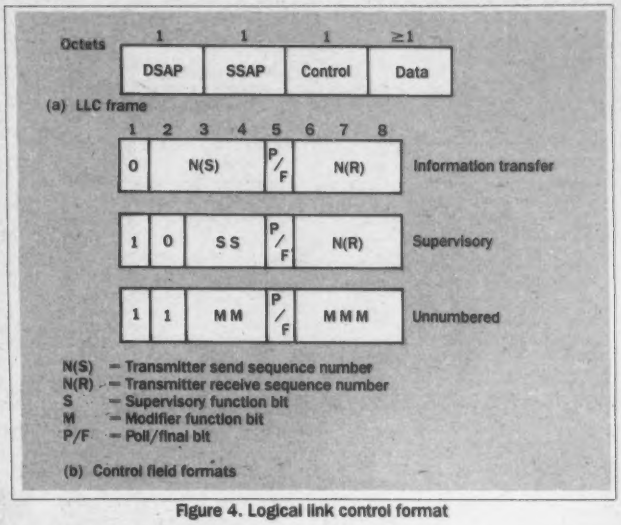

Figure 4. Logical link control format

scheme, a station wishing to transmit first listens to the medium to determine if another transmission is in progress. If the medium is idle, the station may transmit. Now, it may happen that two or more stations attempt to transmit at about the same time. If this happens, there will be a collision; the data from both transmissions will be garbled and will not be received successfully. To account for this, a station waits a reasonable amount of time after transmitting for an acknowledgment. If there is no acknowledgment, the station assumes that a collision has occurred and retransmits.

With CSMA, an algorithm is needed to specify what a station should do if the medium is found to be busy. Three approaches are shown in Figure 5. One algorithm is nonpersistent CSMA. A station wishing to transmit listens to the medium and obeys the following rules:

1. If the medium is idle, transmit.
2. If the medium is busy, wait an amount of time drawn from a probability distribution (the retransmission delay) and repeat step 1.

The use of random retransmission times reduces the probability of collisions. The drawback is that even if several stations have a frame to send, there is likely to be some wasted idle time following a prior transmission.

To avoid channel idle time, the 1-persistent protocol can be used. A station wishing to transmit listens to the medium and obeys the following rules:

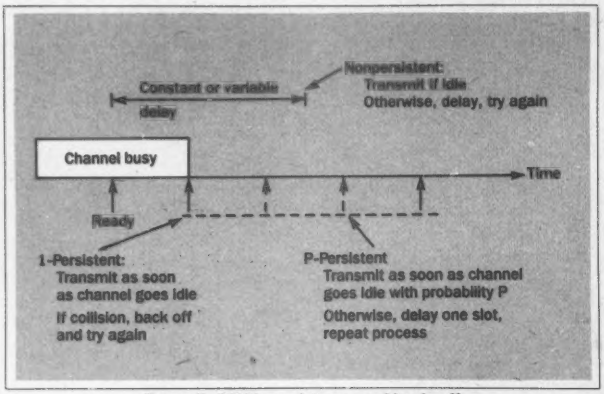

Figure 5. CSMA persistence and back-off

1. If the medium is idle, transmit.
2. If the medium is busy, continue to listen until the channel is sensed idle, then transmit immediately.
3. If there is a collision (determined by a lack of acknowledgment), wait a random amount of time and repeat step 1.

Whereas nonpersistent stations are deferential, 1-persistent stations are selfish. If two or more stations are waiting to transmit, a collision is guaranteed. Things only get sorted out after the collision.

A compromise that attempts to reduce collisions, like nonpersistent, and reduce idle time, like 1-persistent, is p-persistent. The rules are:

1. If the medium is idle, transmit with probability p, and delay one time unit with probability $(1 - p)$. The time unit is typically equal to the maximum propagation delay.
2. If the medium is busy, continue to listen until the channel is idle and repeat step 1.
3. If transmission is delayed one time unit, repeat step 1.

CSMA has one glaring inefficiency. When two frames collide, the medium remains unusable for the duration of transmission of both damaged frames. For long frames, compared with propagation time, the amount of wasted bandwidth can be considerable. This waste can be reduced if a station continues to listen to the medium while it is transmitting. In that case, these rules can be added to the CSMA rules:

1. If a collision is detected during transmission, immediately cease transmitting the frame and transmit a brief jamming signal to ensure that all stations know there has been a collision.
2. After transmitting the jamming signal, wait a random amount of time, then attempt to transmit again using CSMA.

With this addition, the technique is referred to as CSMA/CD. The technique is illustrated in Figure 6. At time t_0, A begins transmitting a frame addressed to D. At t_1, both B and C are ready to transmit. B senses a transmission and so defers. C, however, is still unaware of A's transmission and begins its own transmission. When A's transmission reaches C(t_2), C detects the collision and ceases transmission. The effect of the collision propagates back to A, where it is detected some time later (t_3), at which time A ceases transmission.

IEEE 802 MAC specification

The IEEE 802 MAC specification follows the general outline described above. One detail worth mentioning is the persistence algorithm. You may be surprised to learn that the IEEE 802 standard specifies the 1-persistent algorithm.

Recall that both nonpersistent and p-persistent have performance problems. In the nonpersistent case, capacity is wasted because the medium will generally remain idle following the end of a transmission, even if there are stations waiting to send. In the p-persistent case, p must be set low enough to avoid instability, with the result of sometimes atrocious delays under light load.

The 1-persistent algorithm, which after all means $p = 1$, would seem to be even more unstable than p-persistent because of the greed of the stations. What saves the day is that the wasted time resulting from collisions is mercifully short (if the frames are long relative to propagation delay!); and with random back-off, the two stations involved in a collision are unlikely to collide on their next tries. To ensure that back-off maintains stability, a technique known as binary exponential back-off is used. A station will attempt to transmit repeatedly in the face of repeated collisions, but after each collision, the mean value of the random delay is doubled. After 16 unsuccessful attempts, the station gives up and reports an error.

The beauty of the 1-persistent algorithm with binary exponential back-off is that it is efficient over a wide range of loads. At low loads, 1-persistence guarantees that a station can seize the channel as soon as it

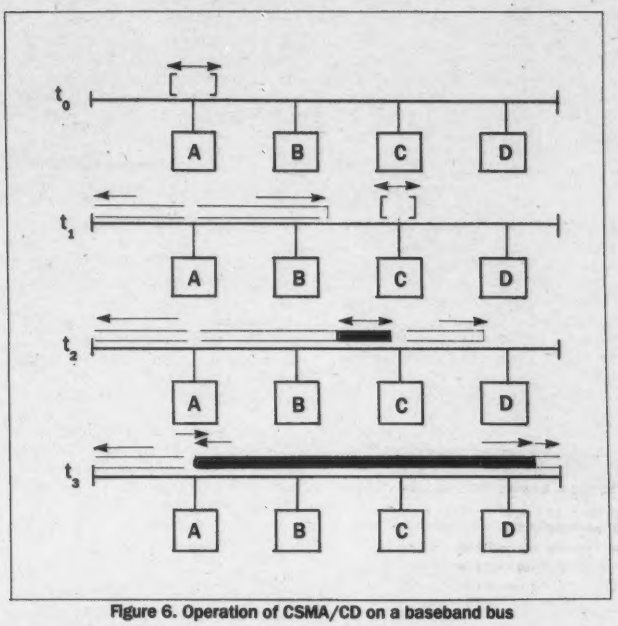

Figure 6. Operation of CSMA/CD on a baseband bus

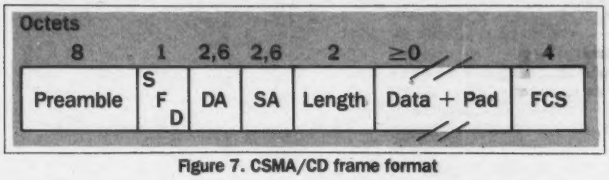

Figure 7. CSMA/CD frame format

goes idle, in contrast to the non- and p-persistent schemes. At high loads, it is at least as stable as the other techniques. However, one unfortunate effect of the back-off algorithm is that it has a last-in, first-out effect; stations with no or few collisions will have a chance to transmit before stations that have waited longer.

Figure 7 shows the MAC CSMA/CD frame structure. The individual fields are as follows:

Preamble: an eight-byte pattern used by the receiver to establish bit synchronization and then locate the first bit of the frame.

Start frame delimiter (SFD): indicates the start of a frame.

Destination address (DA): specifies the station(s) for which the frame is intended. It may be a unique physical address (one destination transceiver), a multicast-group address (a group of stations) or a global address (all stations on the local network).

Source address (SA): specifies the station that sent the frame.

Length: specifies the number of LLC bytes that follow.

LLC data: field prepared at the LLC level.

Pad: a sequence of bytes added to assure that the frame is long enough for proper CD operation.

Frame check sequence (FCS): a 32-bit cyclic redundancy check value. Based on all fields, starting with destination address.

The CSMA/CD physical layer specification calls for a baseband, 50-ohm coaxial cable. In this context, the term baseband refers to the use of digital signaling, as opposed to the use of a modem and analog signaling.

Digital signals are transmitted using Manchester encoding. This is an encoding technique that ensures at least one voltage transmission per bit time. A collision is detected if a larger-than-expected voltage swing is observed.

Several broadband schemes for CSMA/CD are under consideration. Broadband implies the use of analog signals and will allow multiple channels to be carried simultaneously.

Token bus

Token bus is a relatively new technique for controlling access to a broadcast medium, inspired by the token ring technique discussed later.

For token bus, the stations on the bus or tree form a logical ring; that is, the stations are assigned logical positions in an ordered sequence, with the last member of the sequence followed by the first. Each station knows the identity of the stations preceding and following it. The physical ordering of the stations on the bus is irrelevant and independent of the logical ordering (see Figure 8 on ID/34).

A control packet known as the token regulates the right of access. The token frame contains a destination address. The station receiving the token is granted control of the medium for a specified time. The station may transmit one or more frames and may poll stations and

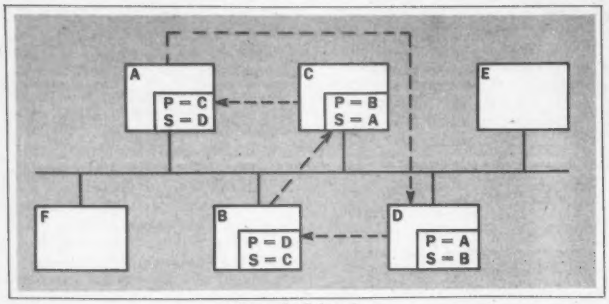

Figure 8. Token bus

receive responses. When the station is done or time has expired, it passes the token on to the next station in logical sequence. This station now has permission to transmit. Hence, steady-state operation consists of alternating data transfer and token transfer phases. In addition, non-token-using stations are allowed on the bus. These stations can only respond to polls or requests for acknowledgment.

This scheme requires considerable maintenance. The following functions, at a minimum, must be performed by one or more stations on the bus:

Ring initialization: When the network is started up, or after the logical ring has broken down, it must be reinitialized. Some cooperative, decentralized algorithm is needed to sort out who goes first, who goes second and so on.

Addition to ring: Periodically, nonparticipating stations must be granted the opportunity to insert themselves in the ring.

Deletion from ring: A station can voluntarily remove itself from the ring by splicing together its predecessor and successor.

Fault management: A number of errors can occur. These include duplicate address (two stations think it is their turn) and broken ring (no station thinks that it is its turn).

Token bus specification

The IEEE 802 token bus protocol follows the general principles outlined above. In general, token-passing and data-passing phases alternate.

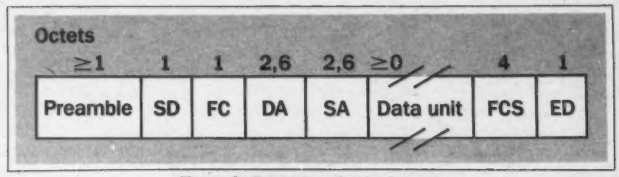

Figure 9. Token bus frame format

Figure 9 shows the MAC frame structure for a token bus. The individual fields are as follows:

Preamble: a one-or-more-byte pattern used by receivers to establish bit synchronization and locate the first bit of the frame.

Start delimiter (SD): indicates start of frame.

Frame control (FC): indicates whether this is an LLC data frame. If not, bits in this field control operation of the token bus MAC protocol. An example is a token frame.

Destination address (DA): as with CSMA/CD.

Source address (SA): as with CSMA/CD.

Data unit: field prepared by LLC.

Frame check sequence (FCS): as with CSMA/CD.

End delimiter (ED): indicates end of frame.

The details of the protocol can be grouped into the following categories, which will be considered in turn:

- Addition of a node.
- Deletion of a node.
- Fault management by token holder.
- Ring initialization.

How to contact IEEE 802

The IEEE 802 Project maintained an open-door policy of participation. At any one working group, about 20 to 30 people showed up. Participants came from a variety of backgrounds within communications and marketing. Most worked for a computer vendor or AT&T. The only other major source of participation was the National Bureau of Standards.

Anyone wishing to comment on or question a particular aspect of the proposed standard should write to the chairman of the appropriate working group:

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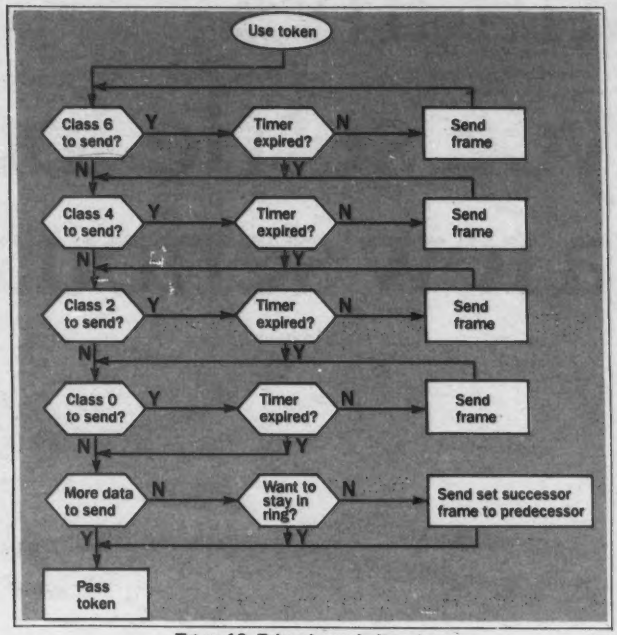

Figure 10. Token bus priority scheme

■ Classes of service.

First, let us consider how a node is added to the ring, using a controlled contention process called *response windows*. Each node in the ring has the responsibility of periodically granting an opportunity for new nodes to enter the ring. While holding the token, the node issues a *solicit-successor* frame, inviting nodes with an address between itself and the next node in logical sequence to demand entrance. The transmitting node then waits for one response window or slot time (equal to twice the end-to-end propagation delay of the medium). Three events can occur:

1. **No response:** Nobody wants in. The token holder transfers the token to its successor as usual.

2. **One response:** One node issues a *set-successor* frame. The token holder sets its successor node to be the requesting node and transmits the token to it. The requester sets its linkages accordingly and proceeds.

3. **Multiple responses:** The token holder will detect a garbled response if more than one node demands entrance. The conflict is resolved by an address-based contention scheme. The token holder transmits a *resolve-contention* frame and waits four demand windows. Each demander can respond in one of these windows based on the first two bits of its address. If a demander hears anything before its window comes up, it refrains from demanding.

If the token holder receives a valid set-successor frame, it is in business. Otherwise, it tries again, and only those nodes that responded the first time are allowed to respond this time, based on the second pair of bits in their address. This process continues until a valid set-successor frame is received, no response is received or a maximum retry count is reached. In the latter two cases, the token holder gives up and passes the token.

Deletion of a node is much simpler. If a node wishes to drop out, it waits until it receives the token, then sends a set-successor frame to its predecessor, instructing it to splice to its successor. If a node fails, it will not pick up the token when the token is passed to it, and this failure will be detected by the token sender, as explained below.

Fault management by the token holder covers a number of contingencies (see Table 2). First, while holding the token, a node may hear a frame indicating that another node has the token. If so, it immediately drops the token by reverting to listener mode. In this way, the number of token holders drops immediately to one or zero, thus overcoming the multiple-token problem (which could be caused by two nodes having the same address). Upon completion of its turn, the token holder will issue a token frame to its successor. The successor should immediately issue a data or token frame. Therefore, after sending a token, the token issuer will listen for one slot time to make sure that its successor is active. This precipitates a sequence of events:

1. If the successor node is active, the token issuer will hear a valid frame and revert to listener mode.

2. If the issuer does not hear a valid frame, it reissues the token to the same successor one more time.

3. After two failures, the issuer assumes that its successor has failed and issues a *who-follows* frame, asking for the identity of the node that follows the failed node. The issuer should get back a set-successor frame from the second node down the line. If so, the issuer adjusts its linkage and issues a token (back to step 1).

4. If the issuing node gets no response to its who-follows frame, it tries again.

5. If the who-follows tactic fails, the node issues a solicit-successor frame with the full address range (that is, every node is invited to respond). If this process works, a two-node ring is established, and life goes on.

6. If two attempts of step 5 fail, the node assumes that a catastrophe has occurred; perhaps the node's receiver has failed. In any case, the node ceases activity and listens to the bus.

Logical ring initialization occurs when one or more stations detect a lack of bus activity of duration longer than a time-out value: The token has been lost. This situation can have a number of causes; perhaps the network has just been powered up or a token-holding station fails. Once its time-out expires, a node will issue a *claim-token* frame. Contending claimants are resolved in a manner similar to the response-window process. Each claimant issues a claim-token frame padded by zero, two, four or six slots based on the first two bits of its address.

After transmission, a claimant listens to the medium and if it hears anything, drops its claim. Otherwise, it tries again, using the second pair of its address bits. The process repeats. With each iteration, only those stations that transmitted the longest on the previous iteration try again, using successive pairs of address bits. When all address bits have been used, a node that succeeds on the last iteration considers itself the token holder. The ring can now be rebuilt by the response window process described previously.

As an option, a token bus system can include classes of service that provide a mechanism of prioritizing access to the bus. Four classes of service are defined, in descending order of priority: 6, 4, 2, 0. Any station may have data in one or more of these classes to send. The object is to allocate network bandwidth to the higher priority frames and only send lower priority frames when there is sufficient bandwidth. To explain, let us define the following variables:

■ THT = token holding time: the maximum time that a station can hold the token to transmit class 6 (synchronous) data.

■ TRT4 = token rotation time for class 4: maximum time that a token can take to circulate and still permit class 4 transmission.

■ TRT2 = token rotation time for class 2: as above.

Condition	Action
Multiple tokens	Defer
Unaccepted token	Retry
Failed station	"Who follows" process
Failed receiver	Drop out of ring
No token	Initialize after time-out

Table 2. Token bus error handling

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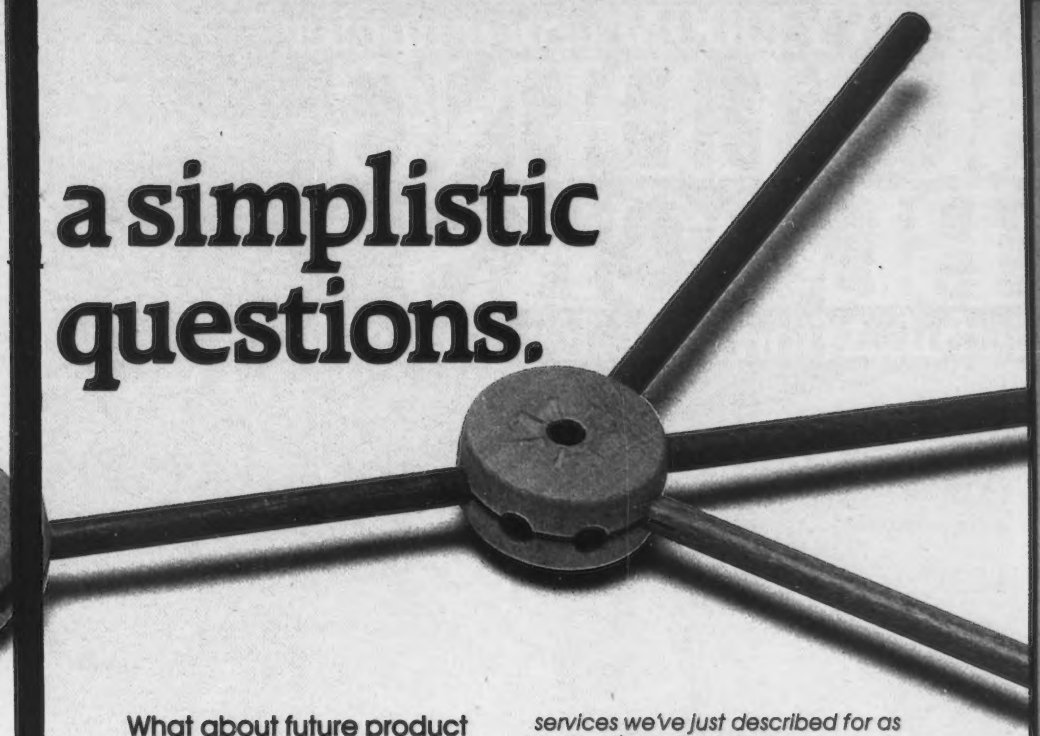
a simplistic questions.



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■ TRT0 = token rotation time for class 0: as above.

When a station receives the token, it can transmit classes of data according to the following rules (see Figure 10 on ID/35):

1. It may transmit class 6 data for a time THT. Hence, for an *n*-station ring, during one circulation of the token, the maximum amount of time available for class 6 transmission is *n* x THT.

2. After transmitting class 6 data, or if there was no class 6 data to transmit, it may transmit class 4 data only if the amount of time for the last circulation of the token (including any class 6 data just sent) is less than TRT4.

3. The station may next send class 2 data only if the amount of time for the last circulation of the token (including any class 6 and 4 data just sent) is less than TRT2.

4. The station may next send class 0 data only if the amount of time for the last circulation of the token (including any class 6, 4 and 2 data just sent) is less than TRT0.

This scheme, within limits, gives preference to frames of higher priority. More definitively, it guarantees that class 6 data may have a certain portion of the bandwidth.

Two cases are possible. If *n* x THT is greater than MAX[TRT4, TRT2, TRT0], the maximum possible token circulation time is *n* x THT, and class 6 data may occupy the entire cycle to the exclusion of other classes. If *n* x THT is less than MAX[TRT4, TRT2, TRT0], the maximum circulation time is MAX[TRT4, TRT2, TRT0], and class 6 data is guaranteed *n* x THT amount of that time.

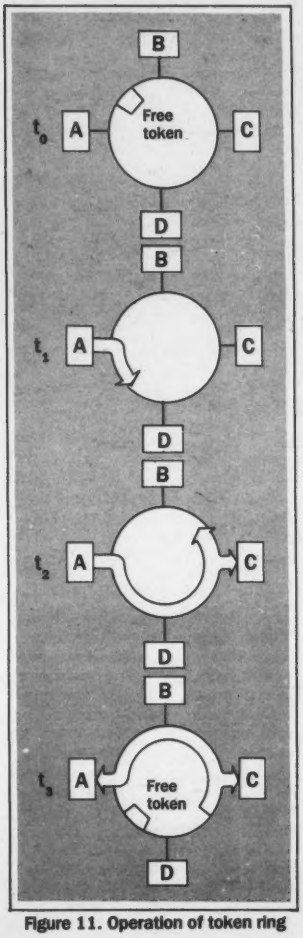

Figure 11. Operation of token ring

Token bus physical layer specification

For token bus, three physical layer specifications are provided as options. All use 75-ohm CATV coaxial cable, and all use modems and analog signaling. This contrasts with the CSMA/CD baseband specification, which uses digital signaling on a special 50-ohm cable.

The simplest and least expensive option uses a form of frequency-shift keying (FSK) and operates at 1M bit/sec. This scheme is known as "single-channel broadband" to indicate that only one channel of signal can be carried; it is not possible to use frequency-division multiplexing. The second option is also single-channel broadband, using FSK at either 5M or 10M bit/sec. In this case, the electronic specifications are such that this option is easily upgradable to the final and most expensive option.

This final option is a full broadband system, which can carry multiple data channels, as well as video channels, simultaneously. Three data rates are provided: 1M bit/sec, which occupies a 1.5-MHz channel; 5M bit/sec, occupying a 6-MHz channel; and 10M bit/sec, occupying a 12-MHz channel.

Token ring

The token ring technique is the only medium access control protocol specified for the ring topology. The token ring technique is based on the use of a single token that circulates around the ring when all stations are idle (see Figure 11). A station wishing to transmit must wait until it detects a token passing by. It then changes the token from "free token" to "busy token." The station then transmits a frame immediately following the busy token.

There is now no free token on the ring, so other stations wishing to transmit must wait. The frame on the ring will make a round trip and be purged by the transmitting station. The transmitting station will insert a new free token on the ring when the station has completed transmission of its frame and the busy token has returned to the station.

If the bit length of the ring is less than the frame length, the first condition implies the second. If not, a

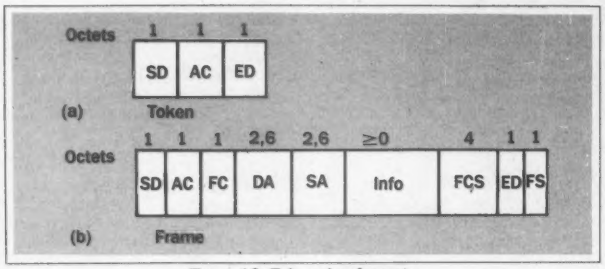

Figure 12. Token ring formats

station could release a free token after it has finished transmitting but before it receives its own busy token; the second condition is not strictly necessary.

In any case, the use of a token guarantees that only one station at a time may transmit.

When a transmitting station releases a new free token, the next station downstream with data to send will be able to seize the token and transmit.

Several implications of the token ring technique can be mentioned. Note that under lightly loaded conditions, there is some inefficiency because a station must wait for the token to come around before transmitting. However, under heavy loads, which is where it matters, the ring functions in a round-robin fashion, which is both efficient and fair. To see how this process works, refer to Figure 11.

Note that after station A transmits, it releases a token. The first station with an opportunity to transmit is D.

If D transmits, it then releases a token, and C has the next opportunity and so on. Finally, the ring must be long enough to hold the token. If stations are temporarily bypassed, their delay may need to be supplied artificially.

Token ring specification

The IEEE 802 token ring specification is a refinement of the scheme just outlined. The key elements are as follows:

1. Single-token protocol: A station that has completed transmission will not issue a new token until the busy token returns. This procedure is not as efficient, for small frames, as a multiple-token strategy of issuing a free token at the end of a frame. However, the single-token system simplifies priority and error-recovery functions.

2. Priority bits: These indicate the priority of a token and, therefore, which stations are allowed to use the token. In a multiple-priority scheme, priorities may be set by station or by message.

3. Monitor bit: It may be used if a central ring monitor is employed.

4. Reservation indicators: They may be used to allow stations with high-priority messages to indicate in a frame that the next token be issued at the requested priority.

5. Token-holding timer: Started at the beginning of data transfer, it controls the length of time a station may occupy the medium before transmitting a token.

6. Acknowledgment bits: There are three: error detected (E), address recognized (A) and frame copied (C). These are reset to 0 by the transmitting station. Any station may set the E bit. Addressed stations may set the A and C bits.

Figure 12 shows the two frame formats for token ring. The individual fields are as follows:

Starting delimiter (SD): a unique eight-bit pattern used to start each frame.

Access control (AC): has the format "PPPTMRRR," where PPP and RRR are three-bit priority and reservation variables, M is the monitor bit and T indicates whether this is a token or data frame. In the case of a token frame, the only additional field is ED.

Frame control (FC): indicates whether this is an LLC data frame. If not, bits in this field control operation of the token ring MAC protocol.

Destination address (DA): as in CSMA/CD and token bus.

Source address (SA): as in CSMA/CD and token bus.

LLC: as in CSMA/CD and token bus.

FCS: as in CSMA/CD and token bus.

Ending delimiter (ED): contains the error detection (E) bit and the intermediate frame (I) bit. The I bit is used to indicate that this is a frame other than the final one of a multiple-frame transmission.

Frame status (FS): contains the address recognized (A) and frame copied (C) bits.

Let us first consider the operation of the ring when only a single priority is used. In this case, the priority and reservation bits are not used. A station wishing to transmit waits until a free token goes by, as indicated by a token bit of 0 in the AC field. The station seizes the token by setting the token bit to 1. It then transmits one or more frames, continuing until either its output is exhausted or its token-holding timer expires. After the busy token returns, the station transmits a free token.

Stations in the receive mode listen

to the ring. Each station can check passing frames for errors and set the E bit if an error is detected. If a station detects its own address, it sets the A bit to 1; it may also copy the frame, setting the C bit to 1. This allows the originating station to differentiate three conditions: 1) station nonexistent/nonactive, 2) station exists but frame not copied and 3) frame copied.

The foregoing operation can be supplemented by a multiple-priority scheme. For example, bridges could be given higher priority than ordinary stations. The 802 specification provides three bits for eight levels of priority. For clarity, let us designate three values: P_m = priority of message to be transmitted by station; P_r = received priority; and R_r = received reservation. The scheme works as follows:

1. A station wishing to transmit must wait for a free token with $P_r \leq P_m$.

2. While waiting, a station may reserve a token at its priority level (P_m). If a busy token goes by, it may set the reservation field to its priority ($R_r \leftarrow P_m$) if the reservation field is less than its priority ($R_r < P_m$). If a free token goes by, it may set the reservation field to its priority ($R_r \leftarrow P_m$) if $R_r < P_m$ and $P_m < P_r$. This has the effect of preempting any lower priority reservations.

3. When a station seizes a token, it sets the token bit to 1, the reservation field to 0 and leaves the priority field unchanged.

4. Following transmission, a station issues a new token with the priority set to the maximum of P_r, R_r and P_m and a reservation set to the maximum of R_r and P_m.

The effect of the above steps is to sort out competing claims and allow the waiting transmission of highest priority to seize the token as soon as possible. A moment's reflection reveals that, as is, the algorithm has a ratchet effect on priority, driving it to the highest used level and keeping it there.

To avoid this situation, two stacks are maintained, one for reservations and one for priorities. In essence, each station is responsible for assuring that no token circulates indefinitely because its priority is too high. By remembering the priority of earlier transmissions, a station can detect this condition and downgrade the priority to a previous, lower priority or reservation.

Summarizing the priority algorithm

We are now in a position to summarize the priority algorithm. A station having a higher priority than the current busy token can reserve the next free token for its priority level as the busy token passes by. When the current transmitting station is finished, it issues a free token at that higher priority. Stations of lower priority cannot seize the token, so it passes to the requesting station or an intermediate station of equal or higher priority with data to send.

The station that upgraded the priority level is responsible for downgrading it to its former level when all higher priority stations are finished. When the station sees a free token at the higher priority, it can assume that there is no more higher priority traffic waiting, and it downgrades the token before passing it on.

To overcome various error situations, such as no token circulating and persistent busy token, one station is designated as active token monitor. The monitor detects the lost-token condition by using a timeout greater than the time required for the longest frame to completely traverse the ring. To recover, the monitor purges the ring of any residual data and issues a free token. To detect a circulating busy token, the monitor sets the monitor bit to 1 on any passing busy token. If it sees a busy token with a bit already set, it knows that the transmitting station failed to purge its frame. The monitor changes the busy token to a free token.

Other stations on the ring have the role of passive monitor. Their primary job is to detect failure of the active monitor and assume that role. A contention-resolution algorithm is used to determine which station takes over.

The physical layer specification for the token ring remains to be fully worked out. The following options are expected:

- A lower speed (1M to 4M bit/sec) ring will use a 150-ohm shielded twisted pair.
- Higher speed (4M to 40M bit/sec) may be provided with baseband coaxial cable.
- It is expected that a fiber-optic ring will be defined at some later date.

In many ways, the work of the IEEE 802 committee has been a resounding success. The committee has completed or is close to completing a full set of standards, which has received widespread acceptance. If there has been a failure, it is that the group did not come up with a single standard for local networks. This failure, however, reflects the diversity of the technology rather than any inadequacy within the committee.

About the author

Dr. William Stallings lectures and writes on data communications subjects. He is the author of Local Networks: An Introduction *(Macmillan, 1984), upon which this article is based.*

Stallings teaches an IEEE 802 course under the auspices of Omnicom, Inc. of Vienna, Va. He is senior communications consultant with Honeywell Information Systems, Inc. in McLean, Va.

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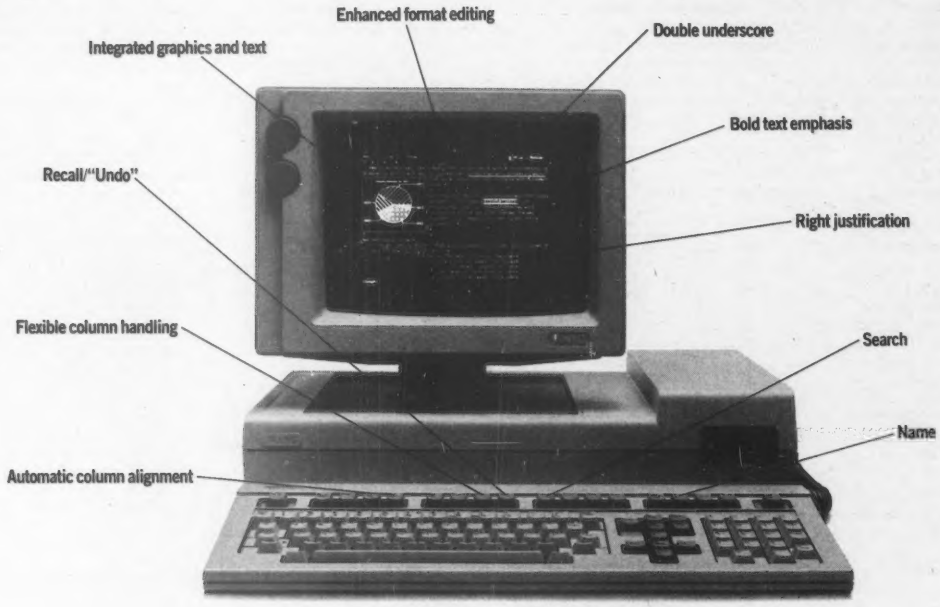

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CW19

IN DEPTH

Technostress

By Craig Brod

It took a thousand years for humanity to incorporate machines in its psyche. It took an era for humanists to call attention to the new psychological problems machines pose. We can no longer wait for hindsight. Technostress is already a reality. We must learn to come to grips with it now.

Jacques Ellul, in *The Technological Society*, pointed out that the impact of new technology on our collective psyche is more forceful now than during the industrial era. Not only has technology become the environment, a ubiquitous part of our lives requiring mastery for survival, but it possesses a power of its own. Machines have become so interconnected that one device necessitates another, which in turn generates the need for more machines and newer applications to keep pace. More computers mean more computer systems and more computerized procedures.

According to Ellul, human character is bound by the computer. We find ourselves confused, overwhelmed and culturally at sea. Our ability to exercise free choice and pursue meaningful lives is made difficult.

Questions of values and free choice are being explored within the technical community itself. Joseph Weizenbaum, professor of computer science at MIT, has written extensively on how the role advocated for the computer by many social scientists and computer professionals intensifies alienation.

Weizenbaum maintains that the espoused benefits of the "information society" are, in fact, questionable. Overreliance on computer systems, in his view, is undercutting people's ability to perceive and evaluate their own lives; the computer reinforces "a kind of pragmatic positivism bordering on scientism."

This approach to the world may

Illustration by Jim Venable

ultimately reduce people's ability to think creatively by not allowing them to see alternatives to their problems. Weizenbaum fears that as people model themselves on the computer, their self-images as dynamic, feeling beings will be eclipsed by the image of the computer as the universal hero.

Although there is no fixed bundle of characteristics we can refer to as human nature, there is a point beyond which we become nonhuman. At this point, we no longer strive to realize our potential to become feeling, sentient beings. The elegance of being human is reflected in our gift of being able to articulate the finest shades of meaning and feeling. Most of us have an inner desire to blossom, to be creative, to expand our horizons and our bonds with others.

Joann exhibits the classic behavior of the technocentered individual. Her relationship to the computer is determining her relationship to all else, and the computer comes first. She has reordered her priorities, and from her perspective, it probably appears to be a good arrangement.

When we make an all-out effort to adapt to new technology and to become, in effect, high-performance machines ourselves, we frustrate those inner strivings. In so doing, we stunt our most valuable human qualities. In recalling those experiences in life we all most prize — occasions when we express strong emotions, appreciate a beautiful work of art, share a touching moment — the force of those experiences leave us no room to doubt that we are people, not machines.

The central question we must try to face is this: Given our tremendous potential as human beings, how well are we living up to our promise? It is claimed that the computer is the greatest extension of human experience and culture thus far — a tool to do our bidding — but this assessment does not match the experience of how our use of computers is affecting our culture.

Most warnings about technology's effect on human character have been couched in general, societal terms. Social critics have tended not to venture from the speculative to the concrete by examining the individual lives of people for whom the computer is their culture. This broad-brush approach is highly useful, but it is incomplete. As Arthur Koestler once commented, "Facts don't bleed. People do."

The computer has spread so far in so short a time that already evidence of how people's characters are being tansformed is all around us. In some cases, the change is subtle; in others, it is dramatic. The latter cases — instances where people have become technocentered — help illuminate what threatens to become the normal behavior of our time.

Technocentered living

Joann is a systems manager for a large urban bank. She is an expert computer programmer and spends most of her time designing new systems for the bank to use. She feels comfortable in her job and challenged by her work. She hates meetings, wants to be left alone at work and experiences her co-workers as an unnecessary burden. She sometimes neglects her personal appearance. When she returns home at the end of the day, she communicates to her husband in a yes-no fashion and soon retreats to her room where she can have peace and quite.

Joann exhibits the classic behavior of the technocentered individual. Her relationship to the computer is determining her relationship to all else, and the computer comes first. She has reordered her priorities, and from her perspective, it probably appears to be a good arrangement. She thinks of herself as successful and well-adjusted, and only friction with her family may force her to see the harm being technocentered has done to her personality.

Highly motivated computer users, like any other achievement-oriented workers, have a strong desire to excel. They want to master their work, expand their abilities and feel challenged. Most cannot tolerate loose ends, sloppy organization, undefined goals. They see themselves as plowing through a succession of problems and leaving a steady trail of completed tasks behind them. This outlook pushes them in the direction of control, because control engenders task completion.

Maladaptation of this kind is not simply the result of character flaws. Our entire culture is pushing people in the direction of computer compatibility. People do not generally learn to master the computer for the same reasons they master the violin. The majority of computer users are forced to learn the technology, directly or indirectly: directly, through fear of losing one's job, or indirectly, through an awareness that career success and advancement hinge on computer skills. Companies expect high performance from their work force just as they do from their machines, and ambitious people must learn to meet the high standards of electronic space or move aside.

Adaptation to intense computer work is a complex phenomenon.

Computer literacy, which once referred to an ability to use software and perhaps do a little programming in Basic, has broadened. It now often means familiarity with several computer languages and systems and, by extension, enough ease with the technology to use it to expand one's own abilities. For the achiever, there is continual pressure to stay on top of the technology, since it is constantly evolving as new products appear, change and disappear. There are no niches to slip into and relax.

Pressure on the computer worker can be enormous. When large companies computerize, slipups can be disastrous: The smallest error can disrupt a delivery schedule or misplace millions of dollars.

The smallest glitch can ruin an entire day. Boundaries between the self and the world of the machine become dangerously fuzzy.

Jack is a senior programmer for a large bank. When a new system goes on line, he spends his night in a motel near the bank so that if problems develop, he is nearby to come fix them. Every night for weeks afterwards, even when he sleeps undisturbed, he dreams that he's received the dreaded phone call — "It blew up!" — and must jump out of bed to get the system running again before the entire staff comes in to use it.

Harrowing or not, this pressure is exactly what many computer workers thrive on. Challenge is often the stimulus that motivates them. Attracted by the possibility of doing jobs faster and better, they push themselves from competence to excellence. Completing a predetermined task is no longer the real goal; designing more difficult tasks and mastering them is.

To create the challenges they need, computer workers keep improving on already workable solutions — writing more elegant code, shortening a procedure — so that the tasks at hand keep expanding to fit the available time. As a result, deadlines are always imminent. The computer workers in this case have a high degree of personal involvement in the work they are doing. Their nervous systems are extremely attuned to minute fluctuations in the work system. The smallest glitch can ruin an entire day. Boundaries between the self and the world of the machine become dangerously fuzzy.

With the new mastery of information and problem-solving skills, mental work loads become heavier. The incessant choices that must be made when a complex task is handled as a sequence of subroutines add to the burden.

At 42, James is a systems analyst at a manufacturing company. An ace analyst, he is a worker with few peers and one who, because few others understand what goes into the job, earns little praise. Since at each job only he understands the various programs, he feels constantly badgered to clarify them to co-workers. He explains, "I feel as though more and more information is demanded of me." Large chunks of his time and energy are drained. He has worked for four employers in 10 years. Each time James quits a job, he feels an intense freedom, a tremendous sense of release that lasts until his knowledge catches up with him at another job. He is, ironically, a victim of his own expertise.

Users may begin to feel tired and find they cannot calculate as quickly, plan as well or make decisions as carefully as before. Mental engagement is high-pitched, concentration intensely focused. The person is immersed in processing information, which overshadows normal sensory awareness. Users may start to lose track of time — a morning spent on a problem can seem like no time at all. Meals are skipped and meetings missed as a problem is pursued. Symptoms of an overtaxed mind are not as easily recognized as those of an overtaxed body, so hardworking computer users bend their minds to questionable limits.

Shelley is a senior systems analyst in her 30s whose design work for a large company includes diagramming responsibilities and calculating work flow. She has to think in a precise and orderly fashion. She is aware that the job is making tremendous mental demands on her, and when she leaves work she needs a long time to disengage from her "work mode" of thinking. To make the transition, she takes a shower, which helps to tell her she is home.

"But that doesn't always work," she says. She cannot always make the break between work life and home life. Shelley has a four-year-old child, and she has begun to worry that her job has affected her abilities as a mother.

"Being a mother is about interruptions," she says, "and being a good mother is being able to handle them. Right now, I just can't tolerate interruptions."

Computer workers like Shelley are not yet technocentered — they are still capable of feelings — but they are on the threshold of becoming emotionally distant, a preliminary symptom of technostress. By contrast, psychologically healthy workers maintain a balanced relationship with whatever technology they use. They are able to be highly involved in their work without losing their own sense of self. When the pressure is on, they can maintain an integrity of personality by paying attention to their own limits, staying in touch with others and looking for ways to

integrate their work with their personal lives.

They remain sensitive to the world and open to the challenges of new experiences. Newness refreshes and deepens them; it does not simply overwhelm or overstimulate them. Most of all, they maintain the capacity for insight — an emotional and intellectual understanding of themselves. Psychologically healthy workers will try to adapt the environment to their needs, not simply adapt themselves to their environment.

But working with computers is a potent activity. Overidentification with the machine can cause an unhealthy relation to one's work, crippling the psychological bases of insight. People in a pretechnocentered state begin to lose perspective; sometimes a pivotal point is reached when they realize that work is becoming all-encompassing, that they are "not themselves." At this point, they may decide to try to come to grips with the situation, acknowledging their personal problems.

This realization does not come easily. Yet without it, these people continue as before and, driven by the desire to excel, slip ever closer to a machine-like ideal. A human-oriented view of the world disappears, replaced by a technology-oriented view.

Technocentered people push themselves in a constant effort to improve their work performance. They ignore their own limits. Mental fatigue sets in and, with it, increasingly rigid thinking, less creative solutions, an unconscious slowdown in work rate and a higher number of errors. Technocentered workers pattern their behavior after the technology. They don't take breaks, they don't talk about nonwork subjects, they don't think abstractly and, above all, they don't question the reason for doing the job. The greater the fit between them and the technology, the less energy is wasted in struggling to improve performance.

Technocentered people are trapped on a treadmill, although they lack the insight and the self-awareness to understand they are. In the process, they sacrifice a feeling grasp of the real world. All that exists outside logical processes seems fuzzy to them.

Scott is an electrical engineer who does computer programming as part of his job. He must use mathematical equations to calculate the most efficient layouts for detailed electrical circuits. He describes his work as a vortex. At home at night — to his wife's distress — he finds himself lost in the equations fixed in his head, his mind going over and over a certain sequence, tracing the endless connections between numbers. It is a problem he feels compelled to solve but cannot. Night after night, at home, his mind makes its logical loops.

Psychological defense

The desire for technical mastery and the absence of social contact reinforce each other. Like a psychological defense, the technocentered person's relations with the outside world remain within safe bounds because the same behavior patterns are repeated again and again. Nothing new is experienced. Little is unpredictable. These people resemble a broken record played over and over. Freud, in referring to neurotics, called this sort of closed behavior the repetition compulsion: repeating past experiences and continually failing. Similarly, technocentered individuals are condemned to repeat a present with which they overidentify.

Where "technoanxious" people experience a sense of accelerated time, technocentered individuals lose all track of it. Hours and minutes are irrelevant as the task at hand consumes consciousness. Natural limits intrude upon them — their workday ends, they eat dinner, they go to sleep — but these seem only irritating discontinuities.

Where staff meetings may be unwelcome interruptions to adapting technical employees, they are intolerable interference to technocentered workers, who feel that meetings detract from their mission to generate code and work intensely with a program.

Jerry is a programmer working on a financial package for a software company. He has always found staff meetings and socializing with coworkers to be an annoyance, but lately he has become angered by any interruption in his work, no matter how trivial. "It's like making love," he says of programming. "If you were making love, you wouldn't want to be interrupted."

Bill, a team leader and lead programmer for IBM, comments, "I hate meetings. I suffocate at meetings. They're a complete waste of time."

Technocentered individuals operate in terms of perfection, sequential thinking, logic. Their entire cognitive structure is geared to the computer. Ambiguity and nuance are concepts the technocentered mind cannot "process." Communication must be efficient. Abbreviated language appeals to them because it accelerates communication. They weave acronyms and technical shorthand into their speech as much as possible. They prefer to communicate with people who are "system literate" so as to transfer information quickly, not interact. People who talk slowly or in general terms are avoided or ignored.

In the early stages of this syndrome, human relationships are a slight irritation. At work, friendships are superficial. Socializing is a vexing intrusion on work at the terminal. At home, excuses start. "One more line of program is all I have." Or, "Sorry for not paying attention, I

was thinking about work." Unfinished tasks dominate their private thoughts. Given a choice, they prefer to be left alone.

In full bloom, the condition leaves no room for excuses. At home, "I'll be through in a minute" becomes "Don't you understand what I'm doing?" At work, tenuous human alliances fade. The most minor interruptions are not merely irritations, they are a major source of stress. For the technocentered person — flat, without affect — it is the friction of social relations, not machine relations, that can provoke outbursts of anger. Such outbursts, however, are not so much manifestations of deep-seated hostility as they are mechanisms to ward off interference. For the technocentered worker, only productivity matters; unstructured, unfocused or irrelevant activity has no redeeming value.

Instead of friendships, technocentered people satisfy what need for social contact they still have by superficial conversations. They have acquaintances, not friends, and the acquaintances are mostly those with whom they can talk shop. Genuine friendships require commitment and energy, and there is little time for either. Talking about nontechnological subjects is an exhausting effort.

Robert is a scientist for a high-tech company. He depends on a computer system daily to sort, analyze and model many of his hunches about chemical processes. He is enthusiastic about his work and often stays after hours. Lately, he has been irritated by things being out of place at home and annoyed by what he perceives to be his wife's slow thinking. He is unsettled when she uses too many words to express herself clearly or when she tells a story. He is angry, generally, because she does not conform to his standards of perfect performance. He takes work home now in the evening so he can be left alone.

For technocentered people, the desire to conquer the system becomes greater than the desire for human relationships and human pleasures. The process of computer operation itself becomes pleasurable. The heightened stimulation of solving problems within a decision tree or making decisions several times a minute is a motivating force all its own. This mental engagement can be as exciting as sexual arousal and makes the habit that much harder to break.

Adding to the stubbornness of the condition is the fact that these people are blind to their own predicament. The push for immediacy, the concentration on present problems only, weakens their ties with past experiences and, thus, their ability to reflect on their lives. Their memories stretch only to the most recent events. For technocentered people, memory becomes "access to past events," an access limited by "search procedures" and "schemes for selected perception."

Increasingly, when pressed for additional or more in-depth information, they will respond, "I haven't got access to that." This answer is not defensiveness, merely a determination that there is insufficient information available to make a reply. Memory, from this perspective, is only recall. The healing power of memory is undermined. Technocentered people forget they once were different.

For the technocentered person — flat, without affect — it is the friction of social relations, not machine relations, that can provoke outbursts of anger. Such outbursts, however, are not so much manifestations of deep-seated hostility as they are mechanisms to ward off interference.

To the casual observer, technocentered people may seem to be the computer age's version of the obsessive compulsive, the character type often associated with workaholics. Technocentered people certainly resemble obsessive compulsives, but the differences are significant.

Both groups have trouble managing time and working within normal schedules. They lose themselves in detail and cannot abide disorder or loose ends. Along with their intense powers of concentration, a fear of losing control is evident. Neither type is capable of appreciating and enjoying the nonwork-related experiences of everyday living, although the obsessive-compulsive person can be warm and affectionate.

Obsessive compulsives in general have an overdeveloped sense of volition, a belief that the world is what they make of it, that willpower shapes all. This attitude leads to both intellectual and emotional rigidity; they sometimes seem to be trying to control and redirect *all* their emotions and desires. The result is a peculiar kind of self-awareness, as though an internal overseer were constantly issuing commands. Obsessive compulsives often fall into role-playing, even going so far as to control the details of their facial expressions and ways of speaking. Compared to other neurotics, they are detached and self-critical; guilty consciences, self-doubt and worry are common. Conflict haunts them.

Technocentered people, by contrast, feel no inner conflict. Where

obsessive compulsives carry out their jobs — whether doctor, lawyer or secretary — "as if" committed to them, technocentered people, whose work is with computers, *are* their jobs. Where obsessives are preoccupied with self-doubt, technocentered people are not. They have no nagging sense that something psychological is wrong. They feel pressure, but they experience it as a desire to excel, to match the perfection of the machine. This absence of conflict is obvious when they talk about their work. Whereas the "overseer" within obsessives drives them to perform work they "should" do, technocentered people never feel forced to do their work. They are attached to it. Their needs and the demands of the system seem one and the same.

Obsessives harbor a latent hostility. They bristle when criticized. They present an appearance of hardness, of being "uptight." Technocentered people, by contrast, effect a waxen expressionlessness. They accept criticism as data to be processed; hostility is too exhausting and irrelevant. Much of computer work, in fact, requires that workers listen to and accept critical suggestions aimed at improving their end product.

Whereas the "overseer" within obsessives drives them to perform work they "should" do, technocentered people never feel forced to do their work. They are attached to it. Their needs and the demands of the system seem one and the same.

A keen sense of personal guilt drives obsessives, who, whether at work or at home, always feel they are not doing quite as they should, which pushes them into acting out even more assiduously their various roles. Technocentered individuals live without guilt. They lack altogether a feeling for other people that is a precondition of guilt. Without guilt, they can easily dismiss appeals from others to change.

The motivation to change is also quite different for the two personalities. Obsessive compulsives have a high tolerance for suffering, but they nevertheless do not lose their ability to suffer. This factor is crucial, because even an incomplete awareness of suffering can serve as a stimulus for change. Obsessives may be pushed to change by a feeling that their lives lack meaning, that their relationships are less than satisfying or that they are not as creative in their work as they would like to be.

Technocentered people are only dimly aware of suffering, if at all. They may freely concede that work is stressful or that they are not pleasant to be with, but they accept that as the way things are. If adjustments are needed, they assume others can make them. They see themselves as successful, even happy. For a breakthrough to occur, an outside crisis is necessary, such as a spouse threatening to leave.

The obsessive compulsive is a classic neurotic personality type, molded by experiences and relationships from early in life. Obsessives bring their bag of neuroses to any activity and any job — stocking shelves, playing softball, managing a company — and turn it into a pressure-filled experience. The personality shapes the work.

The technocentered person is a creation of technology. Victims may once have been sociable, relaxed and caring, and after leaving their computer jobs, they soon become so again. The problem is not rooted in deep-seated neuroses. The work has determined the personality.

Some of the attributes of the obsessive compulsive are greatly valued in today's society, shaped by the Protestant work ethic. Erich Fromm has observed that the obsessive-compulsive is the norm of industrial culture. We admire people who succeed in high-pressure jobs; the self-motivated, hard-charging young executive-on-the-move is a glamorous and envied model.

But computer work invites a dangerous transformation of these qualities. Achievers may bring to any job the desire to perform well, but if the nature of that job is not based on a perfect machine-like ideal, any obsessive-type characteristics are softened and the workers retain their basic humanity. The special demands of working with computers exacerbate those obsessive compulsive qualities without allowing for humanizing influences, such as ample social contact with other workers or a relaxed and informal milieu. The overspecialized character that results from high performance in technical work is destined to become the norm of electronic culture.

About the author

Craig Brod, a psychotherapist who has been in private practice for 10 years, is a consultant to government and industry on how to integrate new technologies into the workplace. He lectures at the University of California at Berkeley Extension/Continuing Education for Business and Management and writes on computers and adaptation.

His experience with computers includes creating programs designed to build a more sensitive match between the individual and the machine. He lives in Berkeley, Calif.‡

COMMUNICATIONS

Lingering effects of breakup seen

By Lynn Haber
CW Staff

WASHINGTON, D.C. — The breakup of AT&T more than a month ago has created a crimp in long-range corporate telecommunications planning, according to attendees interviewed recently at Communication Networks Conference & Exposition (Comnet '84).

"We were anticipating some effects from the divestiture, but not to the degree that they've occurred," said Allen N. Boggs, manager for network development and support at Texas Instruments, Inc. "I'd say we've seen reduced service to the point of having a negative effect on day-to-day business dealings. It's difficult to get service on existing circuits."

Boggs works with a substrategy group of the company's electronic communications strategy group, which deals directly with these types of issues. "Like many people, we blame the Federal Communications Commission [for] not deciding what to do; therefore, AT&T doesn't know where to go, and [all] down the line communications managers don't know how to proceed. Presently, I'd say we're suffering from a lot of frustration."

Mary H. Gallagher, supervisor of telecommunications for Ford Aerospace & Communications Corp., Newport Beach, Calif., said her corporation realizes the need for advanced planning and organization but doesn't have any facts to go on. "There seems to be daily changes of rules and regulations, making advanced corporate planning very difficult," she said.

"At a few of our facilities we put in our own systems. But at three other facilities we have Bell systems. We'll be taking a closer look at changing those systems to a private system, but we're waiting to see what the rate increases will look like. For us, cost is what impacts us the most."

'I'd say we've seen reduced service to the point of having a negative effect on day-to-day business dealings.' — Allen N. Boggs, manager for network development at Texas Instruments, Inc.

Tom Fisher, who works for Reliance Communications Technologies, a supplier of telecommunications equipment in Richardson, Texas, said his company has not yet seen any "hard effects" as a result of the divestiture. But "we didn't do too much planning because we didn't know how it was all going to happen."

Attendees said that because they faced a lack of facts and figures regarding the AT&T breakup, many corporate strategies have been reactive rather than active.

"We knew things were coming, but in terms of strategy we operated in a reactive mode," said John Chambers, supervisor of the data communications management section for the Tennessee Valley Authority in Chattanooga, Tenn. "In conversations with the telephone people, there wasn't any definitive information that they could give us. Therefore, we have to guess as to what to tell our users."

Like many of the other people interviewed, Chambers shared problems like not knowing who to call for service and discovering that the regional holding companies were unsure of their own courses.

Michael S. Friedman, director of sales for Access Engineering Corp., Reston, Va., foresees great new market opportunities as a result of the telephone company breakup. "The [former] Bell operating companies will be hungry for new business — and they'll be looking to outside vendors like they've never done before," he said.

In terms of internal company strategy, Friedman believes the divestiture will simplify that strategy. "For the first time, we'll be allowed access to areas that weren't available to us before."

INSIDE

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Japan prepares to realize dream in 1990s

Special to CW‡

TOKYO — The 1990s will be an era during which the integration of computers and communication technology makes great strides in Japan, moving the country closer to becoming an integrated high-information society.

The Japanese government also wants this period to realize connections between corporate computers and implementation of office automation technologies on a wide scale.

To achieve these goals, Japan's Ministry of International Trade and Industry (Miti) initiated a proposal for a "New Media Community."

At the same time, the Ministry of Postal Service established a concept for a Future Communication Model City which it nicknamed "Teletopia."

Also in pursuit of the concept of the information society, Japan's Telegraph and Telephone Public Corp. (JTT) proposed the Information Network System (INS), which calls for building a new network system and providing a wide range of services utilizing digital technology, optical-fiber technology and other advanced technologies.

The Miti report

In September 1983, Miti released its "New Media Community" report along with a study titled "The High-Information Society and New Media." These reports discussed the impact of new media, such as two-direction CATV and videotex, upon various sectors of society. They also detailed problems to be resolved for the development and implementation of new-media technologies as well as proposals for government action.

One report recommendation, for example, was that the government promptly carry out a total review of the country's communication-related system and attempt to standardize the basic components of the industries that are related to the new media.

The reports went on to say that in order

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Net saves school districts more than $500,000

RICHARDSON, Texas — A regional data processing network recently expanded its services to 214 school districts while saving more than $500,000.

The North Texas Multi-Region Processing Center, headquartered here, was established in 1970 and served just two districts. Today, its IBM 3081-D mainframe processes payrolls, grades, accounting work and other tasks for school districts spread over a 44-county area.

The center saved over $500,000 by using a Datastream Communications, Inc. Model 774 remote controller to tie relatively inexpensive Ascii terminals and microcomputers into the network. Those terminals provided the smaller school districts with the on-line access that larger districts enjoyed with IBM 3270 terminals.

"The smaller districts have historically had to rely on manual procedures because of the costs associated with installing interactive terminals. There's the expense of hardware and software, combined with leasing long-distance lines and adding new staff, which districts on a limited budget simply can't afford," Peter Coffey, assistant director of the processing center, explained.

Some of those smaller districts needed on-line access, while larger districts wanted to improve their access by adding less expensive Ascii devices to installed terminals. "We figured there had to be a way to bridge the gap between the 3270 computer terminals and low-cost Ascii terminals in a network environment so that all the districts could enjoy the benefits of streamlined data processing," Coffey said.

Marvin Sanders, director of the center, estimated that converting thousands of programs to allow use of Ascii terminals would have cost more than $500,000 on top of any hardware costs.

The Datastream 774 supports up to 16 directly attached terminals, or a larger community of casual users on a dial-in, port-contention basis. The center has installed four 774 controllers throughout the region where there are currently 400 IBM 3270s and 36 Ascii terminals, primarily Televideo Systems, Inc.'s Model 910s.

Coffey estimated that it would

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The multi-region processing center at work.

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for the new media to make any headway, restrictions on existing systems should be abolished, which would, therefore, spur new activity and freedom. This, the reports argued, will lead to a more competitive market, and the multiplicity of services which utilize the new media will provide users with a wide selection of services.

In tandem with these ideas, a report concurrently prepared by the Investigation and Research Group for the Future Planning of Telecommunication Systems stated that in order to enhance the freedom of the users and to promote an advanced and sophisticated telecommunication system, principles of free competition should be introduced.

The report also encouraged the utilization of satellite communication, standardization of protocols, consolidation of research and development projects, construction of data bases and the consolidation of legal systems.

The Miti reports maintained that consolidation or standardization of the basics of the new media will enhance progress, conserve resources and contribute to the advancement of the industrial structure of the country.

In terms of data base services, Miti recommended that future procedures for preparation, circulation and utilization of information should be streamlined and standardized.

Construction of various data bases should be promoted, and, at the same time, a clearing service should be established. Finally, the development of data base-related technologies should be pushed forward, according to Miti.

The postal report

The postal report is the result of a round table discussion in October 1983 that was conducted to come up with a "Teletopia" plan.

The premise of the group meeting was that the "high-information society is led by telecommunications as the means for transmitting and processing information."

The report called for a combination of systems in the information society, with an emphasis on JTT's INS and the above Miti concepts, resulting in the realization of "model cities."

JTT's INS

JTT's INS project is budgeted at over $4 billion. The money has been earmarked for the replacement of the existing analog equipment with digital equipment and for the interconnection of Tokyo, Osaka and Nagoya by 1985.

Other major cities will be connected to the digital telephone network in 1987. The system will then be extended to connect cities with populations over 100,000 in 1990, and JTT will eventually extend the digital service to the entire country.

Facsimile communication networks, data networks and videotex communication networks will be connected with the digital telephone network by 1987.

Services utilizing INS will then include advanced telephone services, multifunction facsimile services, image information services, message communication services, data communication services and multimedia communication services.

This article originally appeared in Computerworld's *Japanese affiliate,* Computerworld Japan, *and appears here via the CW International News Network.*

How To Get A Better Grip On Your 3270 Network.

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COMMUNICATIONS SOFTWARE

OPTIMATION, INC.
Software package

Optimation, Inc. has introduced a software package that provides a communications link between any Hewlett-Packard Co. 200 series desktop computer and a Digital Equipment Corp. VT100 terminal emulator via RS-232 lines.

The package reportedly includes the emulation of the full screen editor available to DEC users along with up-and-down loading of files.

It features vertical scrolling of up to 1,000 lines and horizontal panning of up to 1,000 characters with the use of a configuration screen, according to the vendor spokesman.

The system is priced at $300.

Optimation Data Center, 299 California Ave., Palo Alto, Calif. 94306.

FLEXCOMM CORP.
Selvax Link

Flexcomm Corp. has announced the Selvax Link, software that connects Gould, Inc.'s Sel Concept 32 series superminicomputers to Digital Equipment Corp. VAX-11 series superminicomputers.

Selvax Link reportedly integrates operating systems without requiring any modifications. A user can transport files from system to system, communicate with remote system operators or take up residence on a remote system, the vendor said.

The product costs $13,500 for each node connected to a CPU, according to the vendor spokesman.

Flexcomm, 15245 Pacific Highway S., Seattle, Wash. 98188.

NETWORK RESEARCH CORP.
Fusion 2.0

Network Research Corp. has announced the Fusion 2.0, an enhancement to the company's Ethernet software, which allows it to support Advanced Research Projects Agency's Internet and Xerox Corp.'s Xerox Network System protocols.

The software links systems using Motorola, Inc.'s 68000 microprocessor, Unix or Microsoft, Inc.'s MS-DOS operating systems, according to the vendor.

Digital Equipment Corp. VAX-11 and PDP-11 minicomputers can be tied into a network, the vendor said.

Prices range from $750 to $7,500, depending on installation, according to the vendor.

Network Research, Suite 200, 1964 Westwood Blvd., Los Angeles, Calif. 90025.

MULTIPLEXERS/ MODEMS

RACAL-MILGO, INC.
Omnimux options

Racal-Milgo, Inc. has announced two options for its Omnimux series of statistical multiplexers. The bisynchronous channel option reduces transmission delays in bisynchronous data communications systems. The dual aggregate option is designed to reduce the number of multiplexers, modems and/or parallel communications lines in asynchronous systems.

The bisynchronous option provides two channels per card, and each channel operates up to 9,600 bit/sec, using Ebcdic and/or Ascii character sets, the vendor said. The price is $900.

The dual-aggregate option allows two or more Omnimux multiplexers to transfer data over one or more links simultaneously. It is designed for three major asynchronous applications: load sharing, split link and channel bypass, according to the vendor. The price is $1,000.

Racal-Milgo, 8600 N.W. 41st St., Miami, Fla. 33166.

PHALO CORP.
Multiplexer series

Phalo Corp. has announced a series of multiplexers that connect IBM 3270 communication controllers to remote devices.

The multiplexers feature multidrop capability, support for extended distance options and proprietary architecture. Diagnostic capability allows the user to test controllers or remote devices without disconnecting the multiplexer, according to the vendor.

A multidrop system for 32

COMMUNICATIONS

devices costs $7,200; a 32-device system with diagnostic capability sells for $5,695; and an eight-device multidrop system costs $1,750.

Phalo, 65 Moreland Road, Simi Valley, Calif. 93065.

KINEX CORP.
9600 Fast-Poll

Kinex Corp. has introduced the 9600 Fast-Poll, a 9,600 bit/sec modem for multipoint applications on unconditioned leased lines.

The modem continuously monitors and displays line quality. Each time the system is polled, the modem retrains the system so variations in the line will not affect others, the vendor said.

The modem features a built-in error rate tester, comprehensive diagnostics and front-panel control signal display, according to the vendor. The price is $3,350.

Kinex, 6950 Bryan Dairy Road, Largo, Fla. 33543.

NATIONAL COMPUTER COMMUNICATIONS CORP.
NCC 12/24

National Computer Communications Corp. has introduced the NCC 12/24 full-duplex modem for direct-dial line use.

The product handles synchronous or asynchronous data at a rate of 2,400 bit/sec or 1,200 bit/sec, which is compatible with the Bell 212A modem. The modem will automatically adapt and respond to Bell 212A-compatible units at 1,200 bit/sec, the vendor said.

Features include manual and automatic answer modes and test and diagnostic capability including V.54 Loop 2 and V.54 Loop 3 capabilities.

Its price is $1,195.

National Computer Communications, 260 West Ave., Stamford, Conn. 06904.

LIGHTWAVE COMMUNICATIONS, INC.
FO-422

Lightwave Communications, Inc. has announced the FO-422, a fiber-optic modem designed to link terminals, printers and other devices requiring an RS-422 interface.

The FO-422 accommodates data rates of 10M byte/sec over distances of up to one kilometer of fiber-optic cable. It is plug-to-plug compatible with existing RS-422-type, 37-pin, D-subminiature connectors, the vendor said. Its price is $300.

Lightwave Communications, 650 Danbury Road, Ridgefield, Conn. 06877.

LOCAL-AREA NETWORKS

COMPLEXX SYSTEMS, INC.
Xlan Kit

Complexx Systems, Inc. has announced the Xlan Kit, a local-area network system which is designed to link a small number of devices, yet is expandable to handle up to 192 devices at distances of up to 10,000 ft.

The system includes two interface devices that contain built-in modems. The modems feature a 300 bit/sec transmission rate and autoanswer/autodial, 100 ft of twisted, shielded pair wire and the hardware necessary to complete a local-area network, according to the vendor.

The system is a baseband, carrier-sense multiple access local-area network that operates at a transmission rate of 1M bit/sec. The interface can connect Ascii asynchronous terminals, personal computers and other peripheral devices. Each interface has three asynchronous RS-232C ports, the vendor said.

The kit costs $2,995 and can be ordered with up to 3,000 ft of additional wire at 12 cents/ft. Additional interface devices are priced at $1,450.

Complexx Systems, 4930 Research Drive, Huntsville, Ala. 35805.

AUXILIARY EQUIPMENT

THE GRASS VALLEY GROUP, INC.
Wavelink Model 3291 option

The Grass Valley Group, Inc. has announced an option for its Wavelink Model 3291 fiber-optic communications system that provides concurrent audio and data transmission with video on a single fiber.

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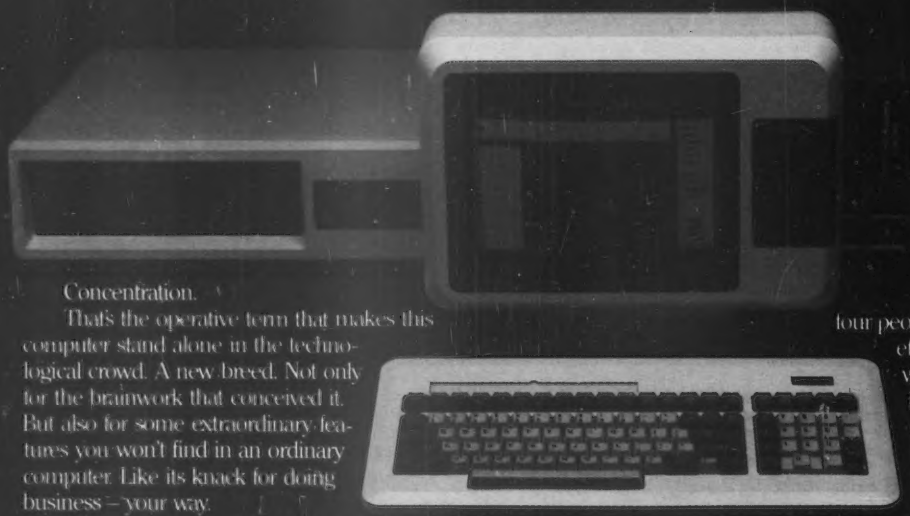
Bred to think ahead.



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The business computer that thinks ahead.

COMMUNICATIONS

Continued from page 95

The option comprises the 3291-11 modulator module and the 3291-12 demodulator module. The Wavelink Model 3291 [CW, Feb. 21] broadband communications system transmits analog signals using an LED source and an FM transmission method over a distance of 10 km in a long-distance version and 2 km in a short-distance version.

The price is $950 each for both modulator and demodulator modules.

The Grass Valley Group, P.O. Box 1114, Grass Valley, Calif. 95945.

TELLABS, INC.
3004X series

Tellabs, Inc. has announced the 3004X series of quad data link interface modules, which provide up to 18 composite data link interfaces for the company's 331 Xplexer data switching system.

The modules include models 3004A and 3004B. The 3004A provides four RS-232C V.24/V.28 interfaces for use with synchronous private-line modems. The 3004B module provides four integral digital line driver/receivers as part of the vendor's Plexerlink interface.

The 3004A costs $450 per interface. The 3004B is priced at $650 per interface.

Tellabs, 4951 Indiana Ave., Lisle, Ill. 60532.

APPLIED SYSTEMS AND PRODUCTS
Universal Modem Adapter

Applied Systems and Products has introduced the Univeral Modem Adapter, which allows a Commodore Business Machines, Inc. Commodore 64 or 20 microcomputer to be used with any type of telephone.

The product supports modular or nonmodular phones, including one-piece electronic phones with built-in dialing, the vendor said.

The Universal Modem Adapter is priced at $14.95.

Applied Systems and Products, 1021-H W. Bishop, Santa Ana, Calif. 92703.

DISTRICTS from page 91

have cost the center $14,000 per site to add 3270s, which some school districts couldn't afford. "We were able to obtain the Ascii terminals for a little over $500 apiece and the four Datastream 774s for $9,950 per system," he noted.

Now, most of the school districts have on-line data processing. Typical uses include grade reports, test scores, student record reports, class scheduling, payroll, warehouse records, vehicle maintenance, tax accounting, fixed assets and personnel-file handling.

"The Datastream equipment has made it possible for the center to automate its information flow, tying together districts that wouldn't even communicate without such a vehicle. Since we installed the 774 units, other manufacturers have come out with similar systems, but as long as the price remains competitive, we plan to stick with what's done the job for us," Sanders said.

The next step for the center will be a printer pass-through upgrade, using Datastream software that Sanders said will turn many of the school district terminals into remote job-entry workstations. That will involve moving up to Televideo 925 terminals.

But one roadblock to that next phase has been finding printers on which users can easily change forms. Sanders said that most users who move into the remote job entry system will need a variety of forms, such as blank checks, that will require continual changes in the feeders.

Earlier networking problems, such as inconsistent power supplies and "normal Ma Bell problems," have been corrected, according to Sanders. He added that Datastream plans to correct another inconvenience — the lack of a local-service technician.

"Overall, we're very satisfied with the project. I would say that the estimate of $500,000 in savings is extremely conservative," he concluded.

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SYSTEMS & PERIPHERALS

Solving future storage problems

SHOP TALK

DAVID WOLF

Special to CW‡

Many DP shops these days are trying to integrate diverse computer systems.

Aside from the problem of developing interfaces for all these systems, there is another problem developing: that is, how DP shops will control information storage and retrieval.

With information storage gaining importance in many information-intensive firms, many businesses have already installed some form of computer-assisted information indexing, storage, retrieval and recall for short-term needs. Desktop microcomputers that interface with a floppy disk drive or mainframe processor regularly accomplish short-term storage and retrieval needs. For longer term applications, both mainframes and microcomputers are often linked to micrographics systems, such as microfilm or microfiche, for information record maintenance.

With the development of the video disk player, a new technology entered the fray. Video disks can play back images through the use of binary code formation and a laser light reader. The challenge was to develop a way for computer users to take advantage of that technology. That challenge appears to have been met in the budding optical disk drive industry.

With all this in mind, there appears to be three key interfacing issues that will make up the office information chain of the future.

First is the information processing facility or center itself. This is where data, words and documents are input and output. Professional managers as well as traditional computer operators will use desktop terminal keyboards, video displays and high-speed printers to enter, review or access information in order to make business decisions.

A second important element in data storage is the temporary or short-term

See DATA page 104

MPP processes satellite data

Supercomputer claims world's fastest I/O rate

By Tom Henkel
CW Staff

AKRON, Ohio — Goodyear appears bent on building big things. Everyone is familiar with the Goodyear Blimps, and now researchers at the Goodyear Aerospace Corp. claim to have developed a computer system with the fastest I/O rate in the world.

Even the name is big. The system is called the Massively Parallel Processor (MPP) and was developed for the National Aeronautics and Space Administration's (Nasa) Goddard Space Flight Center to evaluate satellite data. Installed last May, the system is still being tested and will not be in full production until midsummer, a spokesman for Nasa said.

GOODYEAR

Technically, the MPP is a supercomputer. But it does not use a pipelined architecture like the Cray Research, Inc. Cray 1 and Control Data Corp. Cyber 205. The MPP is a single-instruction, multiple-data processor.

Processors working in parallel

According to Paul Gilmore, program manager on the MPP project, the MPP has 16,384 individual processors working in parallel to perform a single operation. Gilmore said the processor can perform 6.5 billion additions or subtractions in a second. The processor also offers a theoretical I/O rate of 320G byte/sec.

The MPP architecture consists of an array of 128 by 128 custom-designed bit serial processing elements. Each processing element has its own data and memory with associative memory search capabilities, Gilmore explained.

Unlike pipelined supercomputers, which can perform floating-point calculations at extremely high speeds, the MPP garners its speed from thousands of fairly simple processors, all executing instructions simultaneously.

Gilmore said the MPP performs at its best in executing fixed-point calculations. Consequently, the MPP vastly outperforms the Cray 1 and Cyber 205 in applications involving short, fixed-point calculations.

However, for larger, floating-point applications, the pipelined processors show a performance advantage over the MPP, Gilmore noted.

The types of calculations that can be performed by the MPP are particularly useful to scientists doing image processing.

In image processing, such as applications involving satellite data, remote sensing measurements of an object are translated into an array of numbers that represent the object. The numbers can then be analyzed by the processor. In addition to processing satellite data, the image processing technique is used in diagnostic medical imaging, weather forecasting and oil exploration, according to Gilmore.

But in addition to image processing, Gilmore said, the MPP may prove a very useful tool in developing artificial intelligence processors.

Gilmore noted that because the MPP has an extremely high I/O capability, the unit can very quickly scan a large data base for information. Dealing with extremely large lumps of information, such as those required for expert systems, has been one stumbling block to developing artificial intelligence techniques, Gilmore contended.

There is a problem

But even though the MPP has the potential of offering an I/O rate of 320G byte/sec, there is a problem. Gilmore said that currently there are no peripherals, such as disk and tape drives, capable of performing anywhere near the I/O speed of the MPP.

Consequently, the MPP installed at Nasa's Goddard Center has achieved an I/O rate of about 1G byte/sec by using Digital Equipment Corp. peripherals and a DEC VAX-11 series superminicomputer as a front-end processor. Goodyear, he added, is currently working on a project to develop faster peripherals to support the MPP.

Like the Cray 1 and Cyber 205, the MPP carries a hefty price tag. The base price on the system is about $4 million. So far, aside from the Nasa system, Goodyear has yet to receive an order for an MPP. However, it has sold several of the MPP's predecessor, a unit called the Sartan, which is currently being used in projects sponsored by the U.S. Army, Navy and Air Force and Nasa.

INSIDE

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Kurzweil 4000 scanner debuts

Kurzweil 4000 scanning system

CAMBRIDGE, Mass. — Setting its sights on the low-end office automation market, Kurzweil Computer Products, Inc. has announced the Kurzweil 4000, an intelligent scanning system that can input both typewritten and typeset material.

The 4000 features intelligent character recognition, which enables the system to learn to recognize most type fonts. The system can reportedly accomplish this with little user intervention and can learn unique characteristics of a specific font after a user training session.

An offshoot of the reading machine for the blind, a product that gained Kurzweil recognition in 1976, the Kurzweil 4000 is the first product the firm has produced since its take-

See KURZWEIL page 104

IBM chip touts fast data exchange

YORKTOWN HEIGHTS, N.Y. — Engineers from IBM have developed an experimental amplifier chip that reportedly speeds up the data exchange between processors and I/O devices.

IBM claims the device exchanges data 16 times faster than any amplifier the firm currently uses. The chip is located in a controller that uses a fiber-optic transmission line to send data back and forth to a processor.

Currently, an IBM spokesman said, controllers use copper transmission lines to send data at a rate of 25M bit/sec.

With the newly developed amplifier, data can be sent at up to 400M bit/sec. IBM said that rate translates into better than 17,000 typewritten pages in a second.

The fiber-optics device uses strands of refined glass to send laser or LED light, which pulses to convey computer data signals.

A converter at the sending end of the fiber-optics line changes electronic signals to light pulses and sends the signals through the glass fibers. A converter at the receiving end changes the light back into electronic signals, according to the spokesman for IBM.

The technique was designed by Dennis Rogers and Albert Widmer of IBM's Yorktown Heights research facility and was manufactured under the direction of Joseph Mosley at IBM's East Fishkill, N.Y., facility. IBM did not specify when it would use the device in a commercial product.

SYSTEMS & PERIPHERALS

TURNKEY SYSTEMS

MCDONNELL DOUGLAS AUTOMATION CO.
BDS/GDS

McDonnell Douglas Automation Co. (McAuto) recently announced the availability of the Tektronix, Inc. 4115 color raster terminal with its building design system (BDS)/general drafting system (GDS) for architectural and engineering applications.

The terminal reportedly provides a 60Hz noninterlaced refresh rate, a resolution of 1,280 pixels by 1,024 pixels and 256 displayable colors.

The systems are available in turnkey configuration with Prime Computer, Inc.'s 2250, 250, 750 and 850 computers and Digital Equipment Corp.'s VAX-11 series.

Prices start at $129,000 for a system comprised of either three-dimensional BDS or two-dimensional GDS system software with a 4115 terminal and digitizer, a printer and a Prime 2250 computer.

McAuto, P.O. Box 516, St. Louis, Mo. 63166.

PROCESSORS

THE WOLLONGONG GROUP
Pegasus

The Wollongong Group has introduced a family of products for Digital Equipment Corp. VAX-11s.

The Pegasus line was designed for the 32-bit superminicomputers operating under either Unix or DEC's VMS operating system. According to the vendor, Pegasus offloads interactive editing functions, which involve host system context switching and terminal I/O communications in a keyboard-transparent environment.

The Pegasus 1116 consists of 1M byte of memory, a 5¼-in. floppy disk for initial program load and diagnostics and an interface to the Xerox Corp. Ethernet local-area network. It is priced at $30,000.

The Pegasus 2116 has all the functions of the 1116, plus an additional 1M byte of memory and support for multiple VAX host systems. According to the vendor, it entails the provision of terminal multiplexer, concentrator and local-area network switching functions. The price for the 2116 starts at $35,000.

The Wollongong Group, 1129 San Antonio Road, Palo Alto, Calif. 94303.

DATA STORAGE

TANDEM COMPUTERS, INC.
4114 drive; 4110, 4111 price cuts

Tandem Computers, Inc. recently announced a 264M-byte Winchester fixed-media disk drive, designated the 4114, that it said provides greater flexibility and price/performance to users of the firm's Nonstop transaction processing systems. The company also announced price reductions for its 4110 and 4111 128M-byte disk drives.

The 4114 provides 264M bytes of formatted storage in a sealed module. The unit is the top drive in a two-drive cabinet. The bottom drive, designated the 4115, is identical to the 4114, according to Tandem.

The 4114 is compatible with Tandem's other models. When configured at 240M bytes, it can also be mirrored with the Tandem 4104 removable-head, 240M-byte disk drive.

The 4114, including cabinet, is priced at $20,500, and the 4115 is priced at $19,000. Both are available immediately on Nonstop II and Nonstop TXP systems.

Additionally, Tandem reduced the U.S. price of its 4110 and 4111 modules. The 4110 top drive, including cabinet, has been reduced from $19,500 to $15,850, and the 4111 bottom drive has been reduced from $16,500 to $14,350.

Tandem Computers, 19333 Vallco Pkwy., Cupertino, Calif. 95014.

TERMINALS

ZENTEC CORP.
Zentec 1021

Zentec Corp. has announced a low-end terminal that is said to provide the same features as more expensive terminals.

The Zentec 1021 features a 12-in. diagonal screen, ergonomic design, multiple emulations, 32 graphics characters and editing capabilities.

The 1021 terminal comes in two versions. The first emulates several terminals, including the Hazeltine Corp. 1500, Lear Siegler, Inc. ADM 3, Digital Equipment Corp. VT52 and Applied Digital Data Systems, Inc. Viewpoint. The second version, the 1021A, supports the Ansi X3.64 standard.

The terminal is available for $399 in OEM minimum quantities of 100.

Zentec, 2400 Walsh Ave., Santa Clara, Calif. 95050.

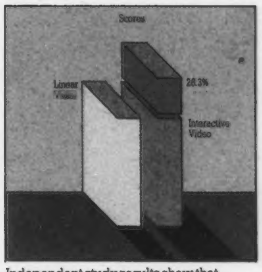
PRINTERS/ PLOTTERS

AMPAK BUSINESS SYSTEMS, INC.
ABS Laser Pro 2700; ABS 200 EPM Thermal Printer; Epson RX-80 Matrix Printer

Ampak Business Systems, Inc. (ABS) has announced add-on printers for IBM minicomputers and microcomputers.

Continued on page 102

THE LONG & SHORT OF NEW UNIX™ INTERACTIVE VIDEO TRAINING.



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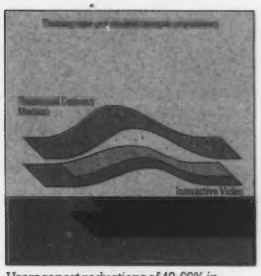

Users report reductions of 40-66% in training time with interactive video.

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Interactive Training Systems, Inc.
4 Cambridge Center, Cambridge, MA 02142

Continued from page 100

The ABS Laser Pro 2700 and the ABS 200 EPM Thermal Printer are based on Xerox Corp. page printers. They were designed to connect with IBM minicomputers through the firm's controller and appear to the IBM system as an IBM 5225 matrix printer.

The ABS Laser Pro 2700 is said to print 12 page/min with 90,000 dot/in., multiple fonts and sizes, graphics capability and dual-input cassettes.

The ABS 200 EPM prints six page/min with 40,000 dot/in., multiple fonts, plain paper printing of text and graphics and auxiliary manual input for envelopes and labels.

ABS is marketing a third printer, the Epson America, Inc. RX-80 Matrix Printer, which incorporates a controller that offers compatibility with IBM's Personal Computer as well as IBM minicomputers, according to a vendor spokesman.

The unit was designed to operate at 100 char./sec, the vendor said.

The ABS Laser Pro 2700 is priced at $23,000, the ABS 200 EPM Thermal Printer at $7,495 and the RX-80 at $2,195.

ABS, 2640 Walnut, Tustin, Calif. 92680.

QUALITY MICRO SYSTEMS, INC.
Lasergrafix 1200 enhancements

Quality Micro Systems, Inc. has enhanced the capabilities of its Lasergrafix 1200 intelligent laser printer.

Enhancements include improved Diablo Systems, Inc. 630 daisywheel printer emulation, Qume Corp. Sprint 9/11 emulation, automatic bar and pie chart generation and improved Tektronix, Inc. 4010 and 4014 plotting, according to the vendor. The printer now supports arc and circle drawing, flood-fill commands and automatic page overlay.

The Lasergrafix 1200 costs $24,995.

Quality Micro Systems, P.O. Box 81250, Mobile, Ala. 36689.

AXIOM CORP.
Axiom TX-1000

Axiom Corp. has introduced a fixed-head thermal printer that provides hardcopy 160 dot/in. resolution with no hardware or software interface.

According to the vendor, the Axiom TX-1000 connects to the raster-scan video output of CRT terminals with a standard coaxial cable. It accepts a variety of video signals, including industry-standard RS-170.

The printer has a 3,000-element print head, which eliminates the need for chemicals or toners, takes 20 seconds to print a complete screen and comes with controls that vary picture positioning and magnification, the Axiom spokesman maintained.

The unit price is $3,395, with quantity discounts available, according to the vendor.

Axiom, 1014 Griswold Ave., San Fernando, Calif. 91340.

GRAPHICS SYSTEMS

GENISCO COMPUTERS CORP.
G-2200

Genisco Computers Corp. has introduced a series of color raster graphics terminals for computer-aided design and manufacturing and engineering (CAD/CAM, CAE) and business and scientific applications.

The basic model, the G-2200, is a terminal with detachable keyboard and a 19-in. color monitor. It features 1,024- by 792-pixel resolution, 60-Hz refresh rate, graphics and built-in support for mouse, tablet and printer.

The G-2200 terminal is software-compatible with the Tektronix, Inc. 4014 and will emulate Digital Equipment Corp.'s VT100 for text editing and data entry.

The RS-232 and RS-422 asynchronous serial links allow the units to receive data at rates as high as 100K bit/sec.

G-2200 costs $12,950.

Genisco Computers, 3545 Cadillac Ave., Costa Mesa, Calif. 92626.

TERAK CORP.
Slash 10; disk drive price cuts

Terak Corp. has an

Continued on page 103

nounced the availability of an embedded, 10M-byte, 5¼-in. Winchester fixed disk drive with its 8510 and 8600 computer systems, as well as reduced prices on certain configurations of its older Winchester disk drive.

The new drive, the Slash 10, is the latest in a series of enhancements to the vendor's current product offerings. It is contained within the chassis of the desktop graphics system in place of one floppy disk drive. The unit enhances system performance while reducing its overall size, according to the vendor.

The Slash 10 is based on a Shugart Associates, Inc. 5¼-in., half-height drive with 12.7M bytes of unformatted capacity, a 99-msec average access time and a 5M bit/sec transfer rate. A minimally configured 8510 with the Slash 10 costs $11,730, while a basic, dual-display, color 8600 system with the Slash 10 costs $21,700.

At the same time, the company announced reduced prices on certain systems using its external 10M-byte, 8-in. Winchester disk drives. The University of Minnesota's Minn-Draft Instructional System with the 8-in. drive is now priced at $21,995, while Engineering Systems Corp.'s Design Graphix Commercial Drafting System with the 8-in. drive costs $32,975. All orders currently on backlog will be reduced to reflect the new pricing, a spokesman said.

Terak, 14151 N. 76th St., Scottsdale, Ariz. 85260.

POWER SUPPLIES

TOPAZ, INC.
Power Conditioner

Topaz, Inc. has announced Power Conditioner, a power fluctuation monitor equipped with a microprocessor.

Power Conditioner monitors voltage fluctuations, detects power surges or sags and determines and supplies power needed to correct a surge, the vendor said. Four circuits reduce power line noise. Peak-limiting circuits reduce high-voltage noise, dynamic clipping circuits suppress low frequency noise, a resistor-capacitor snubber circuit quiets equipment-generated noise and linear filters furnish a 20 decibel attenuation of broadband noise, according to the vendor.

Power Conditioner costs from $7,645 to $14,440, depending on the configuration.

Topaz, 9192 Topaz Way, San Diego, Calif. 92123.

BOARD-LEVEL DEVICES

CONCEPT TECHNOLOGIES, INC.
Graphcard 100

Concept Technologies, Inc. has introduced a graphics controller designed to broaden the uses of the IBM Personal Computer or Personal Computer XT when used as a monochrome system. The product features emulation of Tektronix, Inc. 4010 series terminals.

The graphics controller, called Graphcard 100, implements a Graphic Software Systems, Inc. Ansi GKS Virtual Device Interface Standard. This allows the user to expand the functions of the IBM Personal Computer or XT. It boasts parallel and serial printer ports, as well as a serial port for a mouse, the vendor said. Existing IBM and third-party software programs are run by a circuit board that emulates and replaces IBM's Monochrome and Color/Graphics Adapter Boards, the vendor said.

The Graphcard 100 is said to offer graphics display with a 720-pixel by 352-pixel resolution when the on-board Intel Corp. 80186 coprocessor is used. An intensity level for highlighting provides for high-quality graphics and more interactivity, the vendor said. Graphcard 100 incorporates, through its multitasking system, the Intel 80186 processor to output high-resolution text and graphics to dot matrix printers. Other application functions are executed simultaneously, the vendor said. Low resolution "screen dumps" and the need for a plotter are eliminated by the simultaneous rasterization and application processing.

The Graphcard 100 costs $1,250.

Concept Technologies, P.O. Box 5277, Portland, Ore. 97208.

AUXILIARY EQUIPMENT

DATA EAST USA, INC.
Datafax 2000

Data East USA, Inc. has announced Datafax 2000, a portable, 10-lb, battery-operated facsimile transceiver.

The transceiver allows a user to communicate over pubic or private telephone lines with any CCITT GII fax machine. The product features a read-and-record mechanism capable of printing graphics output and a magnetic coupler which attaches to any telephone receiver, the vendor said.

The transceiver costs $995.

Data East USA, 470 Gianni St., Santa Clara, Calif. 95050.

COMPUSCAN, INC.
Interfaces

Compuscan, Inc. has introduced interfaces that connect the Alphaword Series 80 Pagereader with Digital Equipment Corp.'s WS78, 82, 102, 200 and Decmate word processing systems.

According to the vendor, the Alphaword Series 80 Pagereader is an optical character reader that can increase productivity of the DEC systems. Compuscan's Series 80, a modular scanner, scans and transmits text typed on standard typewriters directly to the DEC systems for recording on disk.

The Alphaword Series 80 with the DEC interface is priced from $10,390.

Compuscan, Building 2, 81 Two Bridges Road, Fairfield, N.J. 07006.

ELECTRO STANDARDS LABORATORY, INC.
Model 9316

Electro Standards Laboratory, Inc. has introduced a 16-channel switching system for IBM 3278-type information display terminals.

The Model 9316 was designed to accept inputs from up to 16 3278-type display stations and switch them either in bulk from one controller to another or in a programmed mix between two controllers. Model 9316 is available in a standard computer-room, rack-mount configuration, costing $1,050; it is optionally available in a desktop version, which costs $1,100.

Electro Standards Laboratory, P.O. Box 9144, Providence, R.I. 02940.

KURZWEIL from page 99

over by Xerox Corp. in 1980. It is also the least expensive device Kurzweil has ever announced, carrying a $35,000 price tag. Early reading machines from the firm cost about $100,000, and the firm's earlier office-oriented scanning machines cost roughly $70,000. .

The Kurzweil 4000 is basically an enhanced version of the firm's first stab at the office automation market — a larger, more expensive machine that did not include the artificial intelligence capabilities of the 4000, noted Michael Backler, Kurzweil's vice-president of marketing.

The 4000 is equipped with an autotrain feature that enables the unit to make its own decisions in identifying text. In a demonstration, the unit was able to read through both typewritten and typeset material. When a new type style is introduced into the 4000, the operator must go through a training session in which the 4000 flashes computer-generated enlargements of characters on a screen along with the most likely letter match. The operator then must either respond by indicating whether the 4000's interpretation of the character is correct. If it is not correct, the operator can input the proper interpretation of the character in question. The 4000 will then make that interpretation in future cases.

Backler noted that the 4000 is usually correct in its interpretation of letters. How long a training session is used for a new font depends on the accuracy required in the application.

In addition to identifying letters, the intelligent character recognition software handles other problems such as determining where the text starts and distinguishing between very similar characters.

The Kurzweil 4000 can read approximately 30 to 40 char./sec. The Kurzweil 4000 comes with a scanning unit, CRT terminal and electronic tablet. The unit can be used as a stand-alone system or in an Ethernet local-area network.

It costs approximately $35,000 from Kurzweil, 185 Albany St., Cambridge, Mass. 02139.

DATA from page 99

information storage device. This will include computer-assisted magnetic media, solid-state chips and changeable optical data disks. All three technologies are easily alterable.

The third factor involving memory is permanent or historical storage. This is an area where computer-linked micrographics media will be used heavily. Other forms of long-term storage will include optical disks, permanent solid-state chips and, of course, paper. Paper is an irreplaceable form of permanent storage. It has specific applications that are eternal.

Each day, the business world becomes more dependent upon information. The various means of storing information for recall can only hold so much.

Eventually all stored information will have to be broken into short- and long-term formats. The challenge facing micrographics systems is to bridge the gap between various technologies.

Wolf is manager, national records systems support, for A. B. Dick Co. in Chicago.

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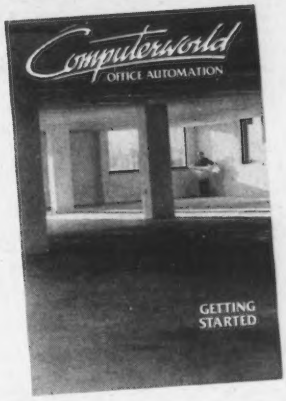

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MICROCOMPUTERS

Apple spurs approval of 3½-in. drives

By Paul Korzeniowski
CW Staff

Apple Computer, Inc.'s use of Sony Corp. 3½-in. disk drives in its recently announced Lisa-2 and Macintosh microcomputers will spur acceptance of 3½-in. drives as the micro floppy (sub-5¼-in.) drive standard, according to industry analysts polled by *Computerworld*.

"Apple's decision provides additional momentum for adopting the 3½-in. drive as the predominant standard," said James N. Porter, president of Disk Trend, Inc., which publishes "Disk/Trend Report," an annual market study.

"The Macintosh drive means that practical technology has come to light in the microcomputer world," said Chris Christiansen, senior analyst at The Yankee Group in Boston. "The next generation of microcomputers will use high-capacity, 3½-in. drives rather than 5¼-in. drives."

The smaller disk drives offer users better reliability, faster data retrieval and more storage capacity than their larger, older brothers, according to manufacturers.

However, because different size drives are vying to become the industry standard, hardware manufacturers have been slow to adopt the new standard. The battle began in 1980, when Sony announced its 3½-in. drive and diskettes. Rather than follow Sony, other companies developed different size drives. Last year, four sizes — 3-in., 3¼-in., 3½-in. and 4-in. — were available to manufacturers.

The 3-in. drive is backed primarily by Japanese companies, including Hitachi Ltd. and Matsushita Electric Industrial Co. Tabor Corp. designed the 3¼-in. drive and signed OEM license agreements with Seagate Technology, Inc. and Micro Peripherals, Inc. IBM announced a 4-in. drive, but last summer dropped plans to produce it.

The non-3½-in. formats have had limited market success. Gavilan Computer Corp. planned to use a 3-in. drive from Hitachi Ltd. for its portable computer. However, it recently dropped the 3-in. drives and switched to a Shugart Associates, Inc. 3½-in. drive.

"When we were designing the computer, no standard had emerged," said Vicki Daniel, a Gavilan spokeswoman. "Our portable could use 3-in., 3¼-in. or 3½-in. drives. Hitachi did not meet our shipment request. Since the 3½-in. drive was emerging as a standard, we decided to use the Shugart drive."

The 3½-in. drives have had more success luring major manufacturers. In July, Hewlett-Packard Co. became the first major manufacturer to use a micro floppy drive in a microcomputer. "Hewlett-Packard gave the product the legitimacy which it was lacking," Christiansen said. "Since [HP] is known for superior products, other manufacturers began looking at quality 3½-in. drives rather than marginal 5¼-in. drives."

See DRIVES page 129

MICRO BITS/PAUL GILLIN

IBM micro plans: considering the Pick option

With the incredible amount of activity in the microcomputer software market in just the past month, speculators are having a field day trying to figure out what IBM has planned next for the Personal Computer.

Big Blue can be expected to make about 450 workstation-related announcements in 1984, according to one industry source. And among these announcements there will no doubt be several operating systems.

Certainly a new version of Unix is in the offing, as is an optimized version of VM on the "4301" high-end micro. Sources say a third operating system is in the works based on a mainframe model and taking advantage of multiple parallel processors based on Intel Corp.'s 80286 or 80386 32-bit microprocessor.

One of the more interesting speculations to date comes from Strategic, Inc. President Michael Killen. He believes IBM just might pull the rug out from under the speculators and endorse Pick & Associates, Inc.'s Pick, a quiet operating system that nevertheless has won a large corps of dedicated followers. Microdata Corp. had been the sole remarketer of Pick for many years before its falling out with the system developers in 1980. Pick is now offered by a number of major OEMs and hardware vendors, including Ultimate Corp.; Applied Digital Data Systems, Inc.; Altos Computer Systems, Inc.; Datamedia Corp.; and Cosmos, Inc.

Cosmos has developed a version of Pick for the Personal Computer that runs on top of IBM's PC-DOS yet is still able to run many Pick programs with the proper modifications. IBM's Boca Raton, Fla., laboratory is known to be evaluating a copy of the Cosmos package.

Why should Pick emerge from nowhere to capture IBM's heart? The operating system is often compared to Unix by virtue of the fact that both are portable across a range of hardware, and neither is considered appropriate in a mainframe environment. Pick enthusiasts say

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INSIDE

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Micros for DSS fueling opportunities, problems

By Harry J. Regan
Special to CW‡

The explosive growth of microcomputer technology over the last few years has left an indelible stamp on the way business analysis is performed. What was once little more than a toy is now becoming the preferred vehicle for decision support systems (DSS).

The introduction of more sophisticated hardware with more processing capability is the fuel firing the rapid acceptance and utilization of micros today. Over two-thirds of the micros installed between now and 1990 will be destined for business use.

Two distinct classes of equipment are emerging in the marketplace: the single-user personal or professional computer and the multiple-user office system. While the latter machine may eventually become the workhorse of the office of the future with respect to word processing, data collection, electronic mail and other applications of a more generalized or routine nature, the personal workstation will become the flagship of the decision maker.

Factors that will determine the success of a business analyst's micro installation include:

■ The ability to access data on a host computer.

■ The ability to link workstations to each other and to shared resources.

■ The ease of use of the equipment and software in its particular application.

■ The transportability and repeatability of analyses.

This last point is an important consideration for ensuring consistency in business analyses for organizations that have a variety of micro hardware. The results generated on one workstation must agree with those run on another brand or type of micro.

Until recently, the majority of formal DSS has been implemented on remote computing services. But this situation is changing. In fact, the micro-based DSS has become a major competitor with remote computing services for DSS implementation. A recent trend in decision support software involves linking the personal computer with mainframe-based software, providing a "best of both worlds" capability.

There are decided advantages to using micros for DSS. These include:

■ The increased productivity of

See DSS page 130

'What-if' analysis of operations

Decision-making operations can be classified into several types of analyses. The most common is the "what-if" analysis, where a deterministic model varies one or more parameters to determine the effect on the whole.

A variation on this theme is the "goal seeking" model, which will compute the values of input parameters necessary to yield a stated output. The complexity of the "what-if" and goal seeking models is dependent on the degree to which the system under scrutiny is being modeled.

Most often these models are stated as simple, linear equations defining the interrelations of the param-

See GOAL page 130

Molecular offers 30M-byte multiprocessor

SAN JOSE, Calif. — Molecular Computer, Inc. has announced a 16-user, 30M-byte multiprocessor system designed for businesses with moderate user and storage requirements.

The Supermicro 16X features 30M bytes of formatted Winchester disk storage and is expandable up to 90M bytes, according to a spokesman. The system reportedly provides each user with a dedicated application processor based on a Zilog, Inc. Z80A microprocessor and 64K bytes of random-access memory (RAM); processors are also available with an optional 16-bit Intel Corp. 8086 processor with up to 1M byte of RAM.

The product reportedly is compatible with Digital Research, Inc.'s CP/M 80, CP/M 86, MP/M 80 and MP/M 86 operating systems and features Molecular's N/Star multiuser network operating system.

All application processors are connected to the system's M/Bus high-speed interprocessor link, which operates with a data transfer rate of 400K byte/sec and can support 18 application processors of either 8-bit or 16-bit configuration, according to the spokesman.

The basic system configuration includes a 30M-byte, 8-in. Winchester disk drive; a 1M-byte dual-sided, double-density, 8-in. floppy disk drive; a Zilog Z80B-based file processor with 256K bytes of RAM; N/Star; and M/Bus. The configuration costs $14,995, and 8-bit application processors are available for $995 each.

Options include a 16-bit application processor for $2,795, a 20M-byte tape backup unit for $2,995 and two additional 30M-byte Winchester disk drives priced at $9,995 for the second drive and $7,995 for the third drive.

Molecular's Application Tools for Office Management integrated word processor, spreadsheet and electronic mail package is available for $1,395 from Molecular Computer, 251 River Oaks Pkwy., San Jose, Calif. 95134.

Small business seen expanding computer use

By James Connolly
CW Staff

NEW YORK — Computer usage by small businesses will jump by 47% in the 12 months ending June 30, with the sales concentrated in those companies with less than 20 employees, according to a study released by *Time* magazine.

The study, "Small Computers for Small Business," showed that 16%, or 566,000, of America's 3.5 million small businesses were using computers at the time of the telephone survey during the first half of 1983. These figures represented a 25.5% increase in market penetration over a three-year period. A small business was defined as one having 500 or fewer employees or sales of less than $25 million.

The projected growth between mid-1983 and mid-1984 was calculated at 47%, or 246,500 new acquisitions and upgrades.

"Retailing apparently will be the hottest market, with 31% of new installations vs. a current 16% share — growing at almost double the industry rate. New sales will continue to be concentrated in the gigantic marketplace made up of companies with less than 20 employees," said the study, produced for *Time* by Focus Research Systems, Inc. of West Hartford, Conn.

The study, which compared the 1983 market penetration to figures for the end of 1979, found that Apple Computer, Inc. led IBM in sales by 2%, but that IBM led Apple slightly in existing installations.

Small businesses were buying more than half of their systems from Apple, IBM, Radio Shack, Digital Equipment Corp. and Commodore Business Machines, Inc., according to the survey.

The size of a business determined the likelihood of computer use, according to the study, with a 70% market penetration in companies with 100 to 499 employees and only 5% penetration in companies with four or less workers.

Geography also influenced market penetration. Southern cities, Atlanta (18.8%), Houston (18.7%) and Los Angeles (17%) had greater projected penetration than New York (12.6%), Philadelphia (13.4%) and Chicago (15.1%).

"The pattern seems to indicate that the older markets — Boston (17.4%) being the exception — may be populated with more grass-roots businesses that are resistant to change and innovation, whereas businesses in developing areas — Houston and Atlanta, for example — are quicker to adopt innovative business methods.

"If true, it will mean that more intense selling efforts will be needed in the older cities," the report said.

Boston may be excepted because of its numerous computer and software companies, the researchers said.

The study is available free upon request on company letterhead from Category Sales Supervisor, Time, Inc., Time & Life Building, Rockefeller Center, New York, N.Y. 10020.

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Apple announces high-speed dot matrix printer

CUPERTINO, Calif. — Apple Computer, Inc. has announced a dot matrix printer designed for reproducing high-resolution graphics at fast speeds.

The Imagewriter is compatible with the Lisa and Apple II and III personal computers and prints high-resolution graphics at a rate of up to 180 char./sec and full text up to 120 char./sec. It uses bit-mapped graphics technology to support Lisa's graphics capabilities.

The printer uses a standard RS-232C serial interface to connect directly with the Apple III's or Lisa's built-in serial ports. Apple's Super Serial Interface Card connects the printer to the Apple II+ or IIe.

The Imagewriter prints in a 7- by 9-dot matrix and features eight fonts. Users can design up to 175 additional characters. Various fonts, underscoring and sub- and superscripts can be mixed in the same printed line.

The new printer provides variable resolution from 72 to 160 dot/in., variable pitch from 10 to 17 char./in., variable line spacing from 1/6 to 1/44 in. and proportional fonts and spacing.

The Imagewriter uses either friction-feed or adjustable-width pin-feed tractors and accommodates a range of paper widths from 3 to 10 inches. It uses single sheets of paper, fan-fold continuous forms, roll stock and precut labels. Up to four copies can be printed at a time.

The Imagewriter is priced at $675 with a 90-day warranty from the vendor. Apple is located at 10260 Bandley Drive, Cupertino, Calif. 95014.

S1 supports up to 256 processors

LAWRENCEVILLE, N.J. — Multi Solutions, Inc. recently announced S1, an operating system designed for a variety of microprocessors and said to offer extensive networking support and simultaneous support for up to 256 processors.

Currently available for use on Motorola, Inc.'s 68000, Zilog, Inc.'s Z80 and Intel Corp.'s 8080, 8085, 8086 and 8088 microprocessors, the modular S1 requires 128K bytes of memory, but reportedly may be configured to use as little as 2K bytes of memory by eliminating unneeded facilities.

The operating system reportedly can read and write files to and from Unix, Digital Research, Inc.'s CP/M and MP/M 11, Microsoft, Inc.'s MS-DOS and Xenix, Regents of University of California's P-System, Technical System Consultants, Inc.'s Flex, IBM's 3741 and others.

Features include multiuser and multitasking support, multiprocessing support, networking support, full screen or bit-mapped displays, bit-mapped printers, multiple windows and plotter and terminal support. Compilers for a variety of languages are available.

Prices for a preconfigured system range from $200 to $950 from Multi Solutions at 660 Whitehead Road, Lawrenceville, N.J. 08648.

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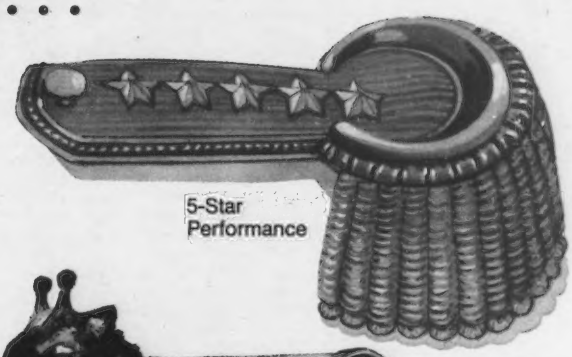

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SYSTEMS

ATV SYSTEMS, INC.
Disk Load Communication Unit

ATV Systems, Inc. has introduced the Disk Load Communication Unit, a turnkey, point-of-sale microcomputer.

The microcomputer uses a Zilog, Inc. Z80 microprocessor, runs Digital Research, Inc.'s CP/M operating system and has 64K bytes of random-access memory. A communications port allows the microcomputer to function as a central processor for a number of cash registers, an emergency backup system to another processor and a distributed processing site, according to the vendor.

The system costs $3,550.

ATV Systems, 2921 S. Damier St., Santa Ana, Calif. 92705.

INCOM SYSTEMS, INC.
The Sidekick

Incom Systems, Inc. recently announced The Sidekick, a briefcase-size microcomputer featuring 16K bytes of random-access memory (RAM), 32K bytes of read-only memory (ROM), a data recorder, thermal printer, modem and ac adapter.

The product reportedly provides current information updates in the form of product pricing, inventory control, service support, order entry and electronic mail.

The system reportedly may be expanded with up to two 32K-byte RAM chips, an additional 32K-byte ROM chip and a plug-in 32K-byte RAM disk. Nickel cadmium power packs provide power for up to six hours before a recharge is required, and the ac adapter plugged into an ac source will provide both operation and recharge, according to a company spokesman. It weighs 15 pounds and measures 19.5 in. by 14.5 in. by 5 in.

The basic model is priced at $1,595 and the RAM disk is priced at $395, with add-on RAM and ROM chips priced at approximately $100 per 8K bytes.

Incom Systems, 4801-24th Ave. N.E., Seattle, Wash. 98105.

MICRO STORAGE

INMAC CORP.
New line of diskettes

Inmac Corp. has announced a new line of 5¼-in. Encore floppy diskettes that are compatible with a variety of computers, including those manufactured by Apple Computer, Inc.; IBM; Radio Shack; Digital Equipment Corp.; Control Data Corp; and NCR Corp.

According to the vendor, the diskettes meet Ansi standards, are guaranteed by Inmac for one year and meet or exceed system requirements.

Prices range from $1.59 for 5¼-in. single-sided, single density to $2.99 for double-sided, double-density diskettes in quantities of four 10-disk boxes.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95051.

SYSTEMS PERIPHERALS CONSULTANTS
Diskitjr; Winchester subsystems

Systems Peripherals Consultants recently announced a 10M-byte hard disk drive for the IBM PCjr, Sanyo Corp. MBC-550 and other small micros.

The Diskitjr's chassis is 2¼ in. high, 6 in. wide and 12 in. deep. It includes a half-high plated media drive with up to 40M bytes of storage. A second version provides 5- or 10M bytes on a removable cartridge, a spokesman said.

The Diskitjr sells for $1,495.

The vendor also introduced several models of Winchester disk drive subsystems featuring from 10- to 40M bytes of fixed media storage combined with a 5M-byte removable cartridge Winchester disk.

The Diskit Combo is compatible with all systems running Microsoft, Inc.'s MS-DOS 2.0 and some running MS-DOS 1.0, the spokesman said.

Prices start at $1,395 for the 5M-byte removable-only system and $2,795 for the 15M-byte fixed/removable version.

Systems Peripherals Consultants, 9747 Business Park Ave., San Diego, Calif. 92131.

COMPUPRO CORP.
H40 Hard Disk Subsystem

Compupro Corp. has announced a 40M-byte hard disk subsystem, including an 8-in. floppy drive for use with its IEEE 696/S-100 bus-compatible microcomputer systems.

The H40 Hard Disk Subsystem features a Quantum Corp. Q540 5¼-in. hard disk, Compupro's Disk 3 DMA disk controller and the Digital Research, Inc. CP/M 80 and CP/M 86 operating systems. All models of the Compupro System 816 product line support the new system.

A double-sided, double-density Qume Corp. Trak 842 floppy disk drive is standard with the subsystem, with 2.4M bytes of storage and the ability to accept single or double-density, single or double-sided media. The subsystem is priced at $5,495.

Compupro, 3506 Breakwater Court, Hayward, Calif. 94545.

BOARD-LEVEL DEVICES

PHAZE INFORMATION MACHINES CORP.
Brigitte

Phaze Information Machines Corp. has introduced a coaxial interface

board for use with IBM Personal Computers. Called Brigitte, the board enhances the Personal Computer with IBM 3278 terminal capabilities by bridging a Personal Computer to a 3270 network, the vendor said.

A Personal Computer can reportedly connect directly to the IBM 4331 mainframe and IBM 3274 or 3276 controllers to access mainframe data.

Brigitte reportedly plugs into any open Personal Computer option slot, and, in conjunction with the included software, provides for instant 3278 replacement. No additional modems or communications devices are necessary, the vendor said.

Brigitte is priced at $1,255 for single units.

Phaze Information Machines, 7650 Redfield, Scottsdale, Ariz. 85260.

LINDGREN ASSOCIATES
RAM Disc Card, package

Lindgren Associates has introduced a line of add-on random-access memory (RAM) cards said to offer from 64K to 256K bytes of additional on-line memory for the Commodore Business Machines, Inc. Commodore 64 microcomputer.

According to the vendor, the RAM Disc Cards can be used for data storage during computation, appending a Basic program from standard disks or executing more than one Basic program directly from the keyboard.

A RAM Disc package is also available. It includes the vendor's RAM Disc memory board with a battery backup, two software packages and a two-slot expansion interface that enables autostart cartridges to use the RAM Disc Card, the vendor said.

A 64K-byte Ram Disc is priced at $370, and each additional 64K bytes of RAM cost $70.

Lindgren Associates, 127 Main St., Brattleboro, Vt. 05301.

TSENG LABORATORIES, INC.
Ultrapak

Tseng Laboratories, Inc. has announced Ultrapak, a graphics and memory expansion board for the IBM Personal Computer.

The board features a parallel port, a serial port and a battery-powered clock and calendar, according to the vendor. Compatible with Lotus Development Corp.'s Lotus 1-2-3, Ultrapak includes 64K bytes of memory, support for 720- by 348-pixel graphics resolution and two pages of bit-mapped graphics, the vendor said.

The board costs $795.

Tseng Laboratories, P.O. Box 566, Newtown, Pa. 18940.

I-BUS SYSTEMS, INC.
I-Bus R188

I-Bus Systems, Inc. has announced a board-level microcomputer system based on the IBM Personal Computer bus structure.

The I-Bus R188 single-board computer is said to allow expansion, with numerous add-on boards available for the Personal Computer. The vendor also offers I-Bus system packaging, including a six-slot chassis enclosure and a nine-slot card cage.

The system uses an Intel Corp. 80188 processor operating at 4.77 MHz and reportedly is upward compatible with software written for the Personal Computer's Intel 8088 processor.

The R188 board includes the processor, 64K bytes of random-access memory, up to 160K bytes of user erasable programmable read-only memory and an RS-232C serial console port.

It is priced at $795 for the computer and $395 to $695 for cages and enclosures.

I-Bus Systems, 9235 Chesapeake Drive, San Diego, Calif. 92123.

AUXILIARY EQUIPMENT

QED INFORMATION SCIENCES, INC.
PC Plus

QED Information Sciences, Inc. has introduced PC Plus, an interactive course designed to run on the IBM Personal Computer, Personal Computer XT and PCjr.

It reportedly teaches users how to operate the Personal Computer, computing fundamentals and the major applications of personal computers, such as word processing, electronic spreadsheets and data base management.

PC Plus modules and hands-on exercises describe and explain system components, storage of records and files, how to operate the keyboard and commonly used computer terms, according to the vendor.

PC Plus, which includes six modules as well as a dictionary, is now available to run on the Personal Computer and Personal Computer XT and costs $59.95.

QED, P.O. Box 181, Wellesley, Mass. 02181.

COMPUTER RESOURCES CORP.
Epson HX-20 parallel port interface

A parallel port interface for the Epson America, Inc. HX-20 notebook-size computer was recently made available from Computer Resources Corp.

The interface unit is said to provide 24 parallel bits of fully buffered input, output or bidirectional data that is user-configurable in 8-bit segments.

In addition, up to 16 parallel port boards can be daisy chained off the expansion connector of one HX-20, according to a spokesman for the company.

The cost of the parallel board is $250, while the connector/LED board is priced at $125 for red LED and at

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$145 for two-color LED, the spokesman said.

Computer Resources, P.O. Box 388, Provo, Utah 84601.

SOFTWARE DIGEST, INC.
'Rating Newsletter'

The first issue of 'Rating Newsletter,' published by Software Digest, Inc., evaluates 30 word processing programs that run on IBM's Personal Computer. Each program was tested by 10 reviewers with various levels of computer experience. Evaluation focused on ease of use, performance, versatility and value for money.

Software Digest plans to evaluate nine other types of software packages in future issues of 'Rating Newsletter.' An annual subscription to the newsletter costs $135.

Software Digest, One Wynnewood Road, Wynnewood, Pa. 19096.

MICRO SOFTWARE

LINDBERGH SYSTEMS
Omniterm 2

Lindbergh Systems has introduced Omniterm 2, an intelligent terminal communications package for the IBM Personal Computer and compatible machines.

Omniterm 2 is a revised version of the Omniterm program for Radio Shack's TRS-80. Both products operate through a command-mode menu in which all communications parameters are grouped in logical categories.

According to the vendor, Omniterm 2 was designed for business and professional users. A scroll-back feature allows the user to view text that has been received, but has scrolled off the screen. DOS files can be viewed and edited in a similar manner while remaining connected to the remote system.

Priced at $245, Omniterm 2 comes with documentation, keyboard overlay, an on-line help function and free telephone support.

Lindbergh Systems, 49 Beechmont St., Worcester, Mass. 01609.

CAMBRIDGE COMPUTER CORP.
PC77/78; PC72/73

Cambridge Computer Corp. has introduced software products for the IBM Personal Computer and Personal Computer XT which allow them to emulate Honeywell, Inc. terminals.

Using PC77/78, the Personal Computer emulates the Honeywell VIP 7700 and VIP 7800 series of synchronous terminals; with PC72/73, the Personal Computer emulates the Honeywell VIP 7200 and VIP 7300 series of asynchronous terminals.

The IBM micro reportedly emulates Honeywell terminals without host system or application software modification, regardless of the operating system.

A file transfer utility is also available, allowing the end user to transfer files between the Personal Computer and Honeywell host computers.

The PC77/78 is priced at $795, and the PC72/73 costs $395. The file transfer utility is priced at $150.

Cambridge Computer, 151 Bender Road, Mount Carmel, Conn. 06518.

TARRTEC INTERNATIONAL, INC.
Name directory

Tarrtec International, Inc. has introduced a data base management system (DBMS) capable of storing 2,000 records on a single disk.

The name directory produces mailing labels and record lists according to user-defined catalog codes or geographically by area codes, states, Zip Codes or partial Zip Codes. Each record contains a field for two names, street address, city, state and Zip Code, phone and catalog code.

The DBMS can search record groups for names, catalog codes or record numbers. Utilities allow reading or printing of all current catalog codes, changing access key, selecting minimum and maximum record range and producing multiple mail labels of individual records.

The minimum requirements for running the program are an IBM Personal Computer XT running under DOS with 16K bytes of random-access memory, one disk drive and a printer. The list price is $40.

Tarrtec, P.O. Box 81, Commack, N.Y. 11725.

CLARITY SOFTWARE CORP.
3-2-1 Go

Clarity Software Corp. has introduced 3-2-1 Go, a program that converts Lotus Development Corp.'s Lotus 1-2-3 work sheets into models for an interactive financial planning system.

The program allows Lotus 1-2-3 users on IBM Personal Computers or compatible micros to create models for use as input to Execucom Systems Corp.'s Interactive Financial Planning System (IFPS)/Personal. In addition, models and data files for the mainframe version can also be produced.

The product runs on the Personal Computer under the PC-DOS 1.1 or 2.0 operating system and requires 96K bytes of memory and two disk drives.

Capabilities include arithmetic expressions, row and column summations and previous and future column references.

Unlimited use within an organization, including copying for multiple in-house personal computer usage, is permitted under a license from Clarity Software. The license fee for 3-2-1 Go is $2,000.

Clarity Software, 11103 Spicewood Pkwy., Austin, Texas 78750.

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It helps you efficiently control all support and service activities ... throughout the data center. With one online, integrated package.

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SOFTWARE from page 119

INFOWARE, INC.
Info-Samp 2.0

Infoware, Inc. has introduced a sampling tool for auditors and other professionals for testing random samples of a population.

Info-Samp 2.0's features include random generation of numbers for a sample; calculation of a statistically valid sample size and number of errors allowed (based on a precision level and degree of confidence); work sheet printing; and an option that saves numbers to be printed again later.

The software runs on the IBM Personal Computer or Personal Computer XT under IBM's PC-DOS Release 1.1 or 2.0 operating system.

The menu-driven package is priced at $85.

Infoware, 2526 N. Lincoln Ave., Chicago, Ill. 60614.

D A DATA SYSTEMS
The Retriever

D A Data Systems has announced The Retriever, the first in its line of Tools Times Three systems software for the Apple Computer, Inc. Apple III microcomputer.

The Retriever was designed to restore automatically accidentally deleted files, without knowledge of disk formats or any other details of machine operation. The user reportedly enters the name of the deleted file, and the package restores the file automatically.

The Retriever is available for $100 from Apple dealers or directly from D A Data Systems.

D A Data Systems, 229 Ravenwood Ave., Rochester, N.Y. 14619.

MICROLINE, INC.
DMS-III

Microline, Inc. has introduced DMS-III, a menu-driven data base management system (DBMS) designed to run on any system using either Digital Research, Inc.'s CP/M or Microsoft, Inc.'s MS-DOS operating system.

The operating system must have approximately 300K bytes of disk capacity, which can be located on two drives.

According to the vendor, DMS-III is able to perform complex calculations within the files, yielding spreadsheet results. The capability makes it adaptable for time and billing reports. A free-form report function allows the user to design reports, the vendor said.

DMS-III is formatted for more than 20 microcomputers, the vendor said.

The system retails for $295.

Microline, 1701 W. Front St., Tyler, Texas 75702.

MICRO DATA BASE SYSTEMS, INC.
Kpaint

Micro Data Base Systems, Inc. has introduced an interactive forms painter for use with its Knowledgeman package.

Called Kpaint, it is an optional component to go with each of the seven standard Knowledgeman components for use with the spreadsheet, data manager and programming language.

It allows a user to design or revise forms directly on the screen, with immediate full-color feedback as each addition or change is made.

Knowledgeman runs on the IBM Personal Computer, Personal Computer XT and compatible machines using Microsoft, Inc.'s MS-DOS, IBM's PC-DOS or Digital Research, Inc.'s CP/M 86 and MP/M 86 operating systems.

The menu-driven Kpaint supports nearly all standard aspects of Knowledgeman forms design. The forms can be used for screen I/O and for printer output. Each form design can include blocks of color, adding up to 64 foreground/background color combinations.

Kpaint allows a user to define or change the position, colors and size of any color block. A form design can also contain literal and nonliteral form elements.

With Kpaint, a user can define, move, copy, delete and change elements. Nonliteral elements can be directly mapped from data base fields, spreadsheet cells and/or working variables. Pictures for automatic editing and integrity checking can be specified.

All Knowledgeman features and functions are integrated. The standard system includes a relational data manager, third-generation spreadsheet, ad hoc inquiries, screen I/O management, printed forms management, statistics generator and structured programming language.

The standard Knowledgeman package costs $500. The optional Kpaint is an additional $100.

Micro Data Base Systems, P.O. Box 248, Lafayette, Ind. 47902.

APPLIED DATA RESEARCH, INC.
ADR/Data

Applied Data Research, Inc. (ADR) has announced the availability of ADR/Data, the first product in its Genie series software for the Digital Equipment Corp. Professional 300 series microcomputer.

ADR/Data, a relational data management system, is a menu-driven package that provides the capability of joining up to three data files during a session and can be used for entry, updating, retrieval, manipulation and reporting of information, according to a spokesman for the company.

Other packages planned for the Genie series include ADR/Graph, a full-color business graphics package, and ADR/Stats, a statistical analysis

and forecasting product for business applications.

ADR/Data is priced at $600, with quantity discounts available, the spokesman said.

Applied Data Research, CN-8, Route 206 and Orchard Road, Princeton, N.J. 08540.

HYPERGRAPHICS CORP.
Hypergraphics

Hypergraphics Corp. has developed a color graphics software package for the IBM Personal Computer and compatible units that is said to produce animated graphics in 26 colors.

Hypergraphics was designed to store up to 1,000 color graphics screens on a 320K-byte floppy disk and can be used as an authoring language for computer-assisted tutorials, to create stand-up sales presentations and marketing diskettes or as part of other software programs. It can also pick up a screen from another software package that is buffer-stored and convert it to color graphics, the company said.

Hypergraphics requires 128K bytes of random-access memory and runs on any IBM Personal Computer or compatible system. It also can be used on the Apple Computer, Inc. Apple IIe. It works with most color graphics boards and will interface with color graphics printers, the company noted.

The Hypergraphics package costs $395, including user documentation, tutorial disk and two system disks.

Hypergraphics, 1908 Stonegate Drive, Denton, Texas 76205.

CROMEMCO, INC.
Cromix Version 20.52

Cromemco, Inc. has introduced a new version of the Motorola, Inc. 68000 microprocessor-oriented Cromix operating system that can support more users than previous versions on a Cromemco D series system, with expanded shell buffers and process tables.

The Cromix 20.52, described by the vendor as a Unix-type system, features a device driver that allows random-access memory (RAM) to act as a disk drive.

The Ramdisk device driver, which is implemented in the software, lets users access disk resources significantly faster in multiuser systems. The Ramdisk is an area of system memory that is set aside during system initialization and can then be used as disk storage.

Up to four disk drives in increments of 64K bytes can be allocated in RAM, up to the full 16M-byte RAM capacity allowed by the 68000 microprocessor.

The Cromix 20.52 has 30 shell buffers and 30 process tables; previous versions were allowed a maximum of 10 shell buffers and 10 processor tables. Up to eight users may use the system simultaneously with up to 16 terminals connected to the system, the vendor said.

The product is available on 5¼- or 8-in. diskettes for $595. Delivery requires 30 days.

Cromemco, P.O. Box 7400, 280 Bernardo Ave., Mountain View, Calif. 94039.

SOFTECH MICROSYSTEMS, INC.
P-system 8087 software upgrade kit

A P-system 8087 software upgrade kit for the IBM Personal Computer, which is said to enable existing P-system application programs to utilize the Intel Corp. 8087 floating point processor, is available from Softech Microsystems, Inc.

The kit allows existing Softech P-system application programs to use the 8087 without any data file conversion or recompilation, the company noted. There are two upgrade configurations available to coincide with the two P-system products available: the Version IV Development System and the Runtime Support System.

Each kit is priced at $20.

Softech Microsystems, 16885 W. Bernardo Drive, San Diego, Calif. 92127.

WESTFORD SYSTEMS, INC.
Micro-Track

Westford Systems, Inc. has introduced Micro-Track, a program for managing and monitoring IBM Personal Computer usage. Micro-Track provides executives with information on how personal computers are being used and who is using them.

Micro-Track runs under IBM's PC-DOS on the IBM Personal Computer and Personal Computer XT. It requires 64K bytes of memory and an 80-char. display; it costs $295.

Westford Systems, 69 Providence Road, Westford, Mass. 01886.

CENTERPOINT COMPUTER APPLICATIONS
Cad from Centerpoint

Centerpoint Computer Applications has introduced Cad From Centerpoint, a picture-drawing program available for the IBM Personal Computer, Apple Computer, Inc. Apple II family and other processors that use the Digital Research, Inc. CP/M 80 operating system.

The product was designed to run

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MICROCOMPUTERS

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on the Hewlett-Packard Co. 7470 and 7475 plotters, Enter Sweet P and Six Shooter plotters, Mannesmann Tally, Inc.'s Pixy 3 plotter, Amdek Amplot II plotter, Houston Instruments and Apple plotters.

According to the vendor, a user can create, store and plot any shape on the plotter. The documentation explains to the user how to draw the desired shape on the grid.

The program is geared for users who need to create custom shapes, designs, logos, diagrams, layouts or schematics with a plotter.

The program costs $149.

Centerpoint Computer Applications, 500 N. Michigan Ave., Chicago, Ill. 60611.

DATAMATE CO.
Enquery

Datamate Co. has announced an English-language report and query generator for the IBM Personal Computer and compatible systems. Called Enquery, the report writer is said to allow selection and display or printing of data fields from existing application files.

Enquery was designed to allow the user to customize a software system without programming. The program understands standard English words and phrases and automatically formats the report for the user. In addition, Enquery can access existing data files without converting them to a data base, the company said.

Enquery can be used with any computer using Microsoft, Inc.'s MS-DOS or IBM's PC-DOS operating system using RM/Cobol. The Cobol compiler is required for the custom dictionary feature.

The typical price for Enquery, with dictionaries for standard applications, is $950. The customizer option is an additional $500.

Datamate, Department CWB3, Suite 128, 4135 S. 100th East Ave., Tulsa, Okla. 74146.

BMDP STATISTICAL SOFTWARE, INC.
Statcat software package

BMDP Statistical Software, Inc. has announced a 40-program package for data analysis on the firm's Statcat microcomputer.

The 1983 release of BMDP Statistical Software is designed to provide flexible statistical procedures for novices and experienced statisticians and data analysts.

Programs reportedly include data description and screening, linear and nonlinear regression, frequency counts and table analysis, multivariate techniques, nonparametric tests, time-series analysis and additional special techniques.

The software package is now available for lease. There is a one-time, first-year, installation fee of $500 and an annual fee of $50/program with a minimum of 10 programs in a package.

BMDP Statistical Software, 1964 Westwood Blvd., Los Angeles, Calif. 90025.

PRO COMPUTING, INC.
Propel

Pro Computing has introduced Propel, an integrated communications and data and word processing package designed for the Digital Equipment Corp. Professional 350 microcomputer.

The package consists of eight modules: telephone directory with automatic dialing, phone call notebook, answering and message service, word processing, electronic mail, meeting and reading notebooks, spreadsheet and graphics. The package features dedicated function keys, preformatted applications and an on-line Help key for each screen, according to the vendor.

The package runs under DEC's P/OS operating system with 512K bytes of random-access memory.

All eight modules cost $1,195; without the three phone modules, the package costs $950.

Pro Computing, Suite 3314, One Penn Plaza, New York, N.Y. 10119.

ADVANCED SYSTEMS, INC.
Microtutor

Advanced Systems, Inc. has announced a diskette-based computer literacy course for the IBM Personal Computer, the Apple Computer, Inc. Apple II and other microcomputers.

Microtutor reportedly teaches personal computing literacy and applications skills on specific software. It was designed to help management personnel and staff understand and use application software, including financial planning, data base management, word processing, programming, accounting and operating systems.

The company reports that Microtutor is available now for more than 20 popular application software programs.

The price for Microtutor is $80/course.

Advanced Systems, 2340 S. Arlington Heights Road, Arlington Heights, Ill. 60005.

COMPUVIEW PRODUCTS, INC.
Systran

Compuview Products, Inc. has announced a utility program designed to move data between operating systems on the IBM Personal Computer and other microcomputers.

Systran reportedly moves data between Microsoft, Inc. MS-DOS and Digital Research, Inc. CP/M operating systems. It is said to produce readable MS-DOS disk formats from CP/M disk formats. The package is also said to convert data files from CP/M to MS-DOS structures, including MS-DOS 1.1 and 2.0. MS-DOS is not needed on the system, according to the company.

Systran is said to run under Digital's CP/M 86 on the IBM Personal Computer or most other computers using the Intel Corp. 8086 microprocessor.

The Systran disk and manual are available now at a price of $120.

Compuview Products, 1955 Pauline Blvd., Ann Arbor, Mich. 48106.

INTEGRATED SOLUTIONS, INC.
Unix 4.2 BSD

Integrated Solutions, Inc. has announced that its version of the Unix operating system, 4.2 BSD, is available on the company's Motorola, Inc. 68010-based CPU cards.

The vendor said this release of the University of California at Berkeley's 4.2 BSD version of Unix features a fast file system for gains in file system throughput and support for the Defense Advanced Research Projects Agency standard commun-

ication protocols as well as higher level application protocols.

A multiuser license for the Unix 4.2 BSD is priced at $1,395, and a single-user license is priced at $995, according to a spokesman for the vendor.

Integrated Solutions, 1350 Dell Ave., Campbell, Calif. 95008.

REALIA, INC.
Termulator; Spacemaker

Two utility programs for the IBM Personal Computer — a Digital Equipment Corp. VT100 terminal emulator and a file compressor — have been announced by Realia, Inc.

Termulator, a VT100 emulator, interprets all features of the VT100 terminal including the VT52 escape code sequence recognition. In addition, Termulator handles transmission and reception of files, retains the IBM Personal Computer color and graphics capabilities and allows key redefinition. It can be used at transmission speeds up to 9,600 bit/sec, the company said.

Spacemaker is a utility program used to compress executable files on the Personal Computer and run on IBM's PC-DOS operating system Versions 1.1 and 2.0.

Termulator is priced at $95, while Spacemaker costs $75.

Realia, 10 S. Riverside Plaza, Chicago, Ill. 60606.

PERICOMP CORP.
Superfile Backup

Pericomp Corp. has announced the Superfile Backup package designed to back up Digital Research, Inc. CP/M or Microsoft, Inc. MS-DOS operating system files of any size, in hard disk or floppy disk formats.

The menu-oriented package allows user selection of such functions as disk changes, copying, retrieving and purging. Proper file sequence on recovery is enforced by prompts, the company said, and the package will not accept diskettes out of sequence. In addition, backup files are read-only.

A Superfile Backup directory provides listings of files and file segments on each backup diskette.

Superfile Backup is priced at $49.95, with quantity discounts available.

Pericomp, 14 Huron Drive, Natick, Mass. 01760.

RADIO SHACK
Micro Color Compac

Radio Shack has introduced the Micro Color Compac, a program that is said to allow its TRS-80 Micro Color Computer Model MC-10 to communicate by telephone with information services such as Compuserve Information Service or Dow Jones Information.

Micro Color Compac is a machine language program on cassette tape that gives the user access to news, weather, sports, electronic mail and personal computing services offered by Compuserve, as well as the current market quotes, financial statistics and transcripts of the Public Broadcasting Service television program *Wall Street Week*, information that is available to the Dow Jones service's subscribers.

Communications protocols are set by the user, but the setting must match those of the computer system with which the MC-10 is communicating. Protocol options include communications rates of 110, 300 or 1,200 bit/sec; half or full duplex; word length of 7 or 8 bits; automatic line feed on or off; and text display of either upper and lowercase or uppercase only.

The program costs $29.95 and is available through Radio Shack computer centers and dealers.

Radio Shack, 1800 One Tandy Center, Fort Worth, Texas 76102.

NEW ERA TECHNOLOGIES, INC.
Mist+

New Era Technologies, Inc. (NET) has announced Mist+, an integrated communications package for the IBM Personal Computer.

Designed to work with the Hayes Microcomputer Products, Inc. Smartmodem, Mist+ is also suitable for the IBM Personal Computer XT and compatible systems.

Mist+ includes communications links for most popular on-line services. The program can connect to one of these services on-line or in unattended mode, send and receive files, search on-line

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data bases, disconnect or initiate another session with a different computer, the company explained.

Mist+ can also use interactive routines to gather additional information from the user, such as names of persons to whom the message is to be sent, what data base to search, what keywords to use and the name of the file in which the search results should be recorded. All telecommunications parameters are set, and all host commands are transmitted automatically by Mist+ routines, the company said.

The Mist+ system also allows a Personal Computer to be used as a remotely accessible host that permits the user of any dumb terminal, microcomputer or word processor to retrieve files, compose, send and store messages. A multilevel password system supports up to 900 users.

An optional text-oriented data base management system is also available.

Mist+ is priced at $295 or $495 with the data base option. Along with the release of Mist+, NET has reduced the price of its Digital Research, Inc. CP/M operating system version of Mist to $225 and $375 with the data base option.

NET, Suite 924, 2025 I St. N.W., Washington, D.C. 20006.

MANAGEMENT ANALYTIC SUPPORT, INC.
Cope

Management Analytic Support, Inc. has announced Cope, a system for solving linear and integer programming problems on a microcomputer.

According to the vendor, the Cope microcomputer package is based on the mainframe version previously available on Digital Equipment Corp.'s VAX-11 minicomputers, the DEC 20 and Hewlett-Packard Co.'s HP 3000 series systems.

Cope incorporates features such as optional narratives, prompts and a self-teaching tutor to walk the user through the system's procedures.

The initial implementation is available for the Sage Computer Technology Sage microcomputer, configured with Digital Research, Inc.'s CP/M 86 operating system.

Cope is configured for three ranges of applications: 40 constraints by 80 variables retails for $335; 80 by 200 is $465; and 150 by 300 is $685.

Management Analytic Support, 6826 Dean Drive, McLean, Va. 22101.

ON-LINE BUSINESS SYSTEMS, INC.
Wylbur/PC

On-Line Business Systems, Inc. has introduced Wylbur/PC, a program development package for the IBM Personal Computer.

Wylbur/PC features screen layout control for panel design and menu display, background and foreground color control and the capability to communicate with mainframe software products, the vendor said. The communications capability is programmable and can run automatically.

A full screen editor features four-way scrolling, global search and replace functions and 400 possible function-key definitions, according to the vendor.

Wylbur/PC requires 128K of random-access memory. There is a version that runs on mainframe computers.

A demonstration diskette costs $10, while the complete program sells for $550.

On-line Business Systems, 115 Sansome St., San Francisco, Calif. 94104.

MICRO COURSEWARE CORP.
Computer Tutor 150

Micro Courseware Corp. (MCC) has announced a front-end tutorial package that is being bundled with the Hewlett-Packard Co. HP 150 personal computer.

Computer Tutor 150 reportedly uses interactive learning modules to introduce users to the HP 150 hardware, the system's touch feature and the applications manager that explains the operating system and application software.

The tutorial includes examples of software applications, a glossary of microcomputer buzzwords and educational games to reinforce comprehension, according to a spokesman for the company.

The package was customized by MCC for Hewlett-

Packard.

The HP 150 is available now with Computer Tutor 150, according to the company spokesman.

Suggested retail price of the HP-150 is $3,995.

Micro Courseware, 4444 Geary Blvd., San Francisco, Calif. 94118.

COMPU-DRAW SOFTWARE HOUSE .Rel/m

Compu-Draw Software House has introduced .Rel/m, a package of programs for maintaining and organizing user-generated, relocatable object code libraries that use the .Rel file format.

The programs, comprised of Library Cross Reference (LX) and Library Sequencer (LS), run under the Digital Research, Inc. CP/M operating system with 32K bytes or more memory and one or more disk drives. LX is priced at $59; LS is $89. Both programs may be purchased for $129.

Compu-Draw Software House, 1227 Goler House, Rochester, N.Y. 14620.

MANAGEMENT INFORMATION SYSTEMS
Tempus-Link

Management Information Systems has announced Tempus-Link, a mainframe and personal computer package that allows the user to format IBM's Vsam files onto virtual floppy diskettes.

According to the vendor, the IBM Personal Computer can store up to 15M bytes of data per file and access that data as if it had real diskette drives.

Tempus-Link runs under IBM PC-DOS 1.1 and 2.0 as well as Microsoft, Inc.'s MS-DOS on the IBM Personal Computer and Personal Computer XT. Controlling the software are MVS, VSE and CICS/VS 1.5 and 1.6. Most Personal Computer-to-mainframe communications are supported, the vendor said.

An entry-level system retails for $995.

Management Information Systems, 376 Moody St., Waltham, Mass. 02154.

HAYDEN SOFTWARE CO.
Writer; Speller; Producer; Calendar

Hayden Software Co. has introduced its productivity line of professional software, the Writer, the Speller, the Producer and the Calendar.

The Writer, a word processor, and the Producer, a computer slide show producer, are currently available for the Apple Computer, Inc. Apple. The Calendar, an appointment calendar, and the Speller, a spelling checker, are for the IBM Personal Computer.

Prices are as follows: Writer, Apple II, II+, IIe, $59.95; Speller, IBM Personal Computer or compatible, with 64K bytes of memory, $49.95; Calendar, IBM Personal Computer or compatible, with 128K bytes of memory, $49.95; and Producer, Apple II, II+, IIe, $99.95.

Hayden Software, 600 Suffolk St., Lowell, Mass. 01853.

MARK OF THE UNICORN, INC.
PC/Intercomm on Z100

Mark of the Unicorn, Inc. has announced that its PC/Intercomm now operates on the Zenith Data Systems Corp. Z100 microcomputer.

PC/Intercomm lets the Z100 emulate Digital Equipment Corp.'s VT100. With PC/Intercomm, Z100 users can talk to DEC host minicomputers and run full screen applications programs.

PC/Intercomm has 30 programmable function keys and operates under 128K bytes of memory with one disk drive and an RS-232 Ascii communications port. The product is priced at $99.

Mark of the Unicorn, 222 Third St., Cambridge, Mass. 02142.

MEGAHAUS CORP.
Megawriter version

Megahaus Corp. has released an updated version of Megawriter, a word processor with mail merge, for the Apple Computer, Inc. Apple II and IIe microcomputers.

According to the vendor, the Megawriter comes complete on a single disk. Improvements include a faster boot time, adjustable tabs and the ability to read and write both Apple DOS files and Pascal files. Megawriter costs $99.

Megahaus, 5703 Oberlin Drive, San Diego, Calif. 92121.

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O'HANLON COMPUTER SYSTEMS, INC.
Sensible Solution 2.0

O'Hanlon Computer Systems, Inc. has announced Version 2.0 of the Sensible Solution, a data base management system and procedural programming language.

The vendor said Version 2.0 is 50 times faster than the original version at calculations and string handling. The speed is now comparable to other major languages, such as C, and is faster than Cobol or Pascal.

Sensible Solution 2.0 costs $695.

O'Hanlon Computer Systems, 11058 Main St., Bellevue, Wash. 98004.

NEC INFORMATION SYSTEMS, INC.
Packages for NEC Advanced Personal Computer

NEC Information Systems, Inc. has announced agreements with Microsoft, Inc. to market its Microsoft Pascal Compiler and with Context Management Systems, Inc. to use the Context MBA integrated software package, both for use with the NEC Advanced Personal Computer, according to NEC.

The price for the Context MBA software package is $695.

The Microsoft Pascal Compiler is priced at $495, a NEC spokesman said.

NEC Information Systems, 1414 Massachusetts Ave., Boxborough, Mass. 01719.

NEC INFORMATION SYSTEMS, INC.
Software for Advanced Personal Computer

NEC Information Systems, Inc. has announced an expanded range of software packages that run under Microsoft, Inc.'s MS-DOS operating system for its Advanced Personal Computer.

Applications and their prices include the following: Metasoft Corp.'s Benchmark Word Processor, $495, Benchmark Telecommunicator, $95, and Benchmark Mailing List Manager, $195; Chang Laboratories, Inc.'s Business Planner, $495, Spreadsheet/Planner Upgrade, $350, Consolidator, $295, and Spreadsheet, $195; Ashton-Tate's Dbase II, $695, Bisynch-86/3780 and 3270 emulators, $990.

NEC Information Systems, 1414 Massachusetts Ave., Boxborough, Mass. 01719.

AMDEK CORP.
Driver for Amplot II

Amdek Corp. has announced a driver for the Amplot II, a six-color X-Y coordinate plotter.

According to the vendor, the driver is currently available free to users of either Lotus Development Corp.'s Lotus 1-2-3 or Amplot II, a microprocessor-intelligent plotter that accepts Ascii commands. Amplot II has built-in software for arc and circle generation, windowing and other functions. It has RS-232C and 8-bit parallel interfaces.

The Lotus 1-2-3 was developed specifically for Amdek's plotter. The 10-in. by 14-in. plotting range, automatic pen selection and pen speed make it applicable for business graphics or engineering applications, the vendor said.

The suggested retail price of the Amplot II is $1,099.

Amdek, 2201 Lively Blvd., Elk Grove Village, Ill. 60007.

VOICE OPERATED COMPUTER SYSTEMS
Mopi

A software development package that is said to allow each user to define his own set of instructions has been developed by Voice Operated Computer Systems (Vocs).

Called Mopi, the assembler/compiler contains the basic elements from which assembly language-type instructions can be defined. Designed as a universal cross-assembler, Mopi is capable of generating the machine code for any 8-bit microprocessor, the company said.

Currently available for use with Digital Research, Inc.'s CP/M 80 operating system, Mopi can be modified for use with other systems as well. The software is supplied under a license agreement for $150.

Vocs, P.O. Box 3705, Minneapolis, Minn. 55405.

OMTOOL CORP.
Softbol release

Omtool Corp. has announced a release of its business language, Softbol, that is said to allow users of the IBM Personal Computer, as well as computers that support Microsoft, Inc.'s MS-DOS and IBM's PC-DOS, to run all of the business applications written for Digital Equipment Corp.'s commercial language Dibol.

Softbol is a business language that includes a compiler, interpretive runtime system, symbolic debugger, indexed key file system and sort utility.

Softbol, priced at $400, is also available for other operating systems, including Unix, Microsoft's Xenix, Digital Research, Inc.'s CP/M 80 and CP/M 86.

Omtool, P.O. Box 477, Tewksbury, Mass. 01876.

COURSEWARE, INC.
PC Master

Courseware, Inc. has announced that its self-learning software package for the IBM Personal Computer and Personal Computer XT has been enhanced to include sections for

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What full service stations do for their customers, we at Zilog do for ours.

pare its service to the kind you get from your local service stations. Because the right kind can mean the difference between confidence and uncertainty.

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Systems

Zilog

an affiliate of Exxon Corporation

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IBM's PCjr home computer.

PC Master includes three diskettes of computer instruction, including computer graphics.

The product is available under PC-DOS 2.1 for the IBM PCjr and under PC-DOS 1.1 and/or 2.0 for the Personal Computer and XT.

The enhanced version of the PC Master is priced at $79.50.

Courseware, 10075 Carroll Canyon Road, San Diego, Calif. 92131.

SOFTWARE MANUFACTURERS, INC.
S-Tran; Spectrum

Software Manufacturers, Inc. (SMI) has announced two products designed for software development under the Unix operating system.

S-Tran is a translator that produces source C language statements from popular versions of Basic. Spectrum is a set of application modules available in C.

With S-Tran, Basic programs are transferred into a file on a Unix-based system and then translated as a group by using a single command. S-Tran's runtime package, required to run all translated programs, also reportedly serves as a development tool.

The products are available for 8-, 16- and 32-bit machines from Altos Computer Systems, Inc.; Codata Systems Corp.; Plexus Computers, Inc.; NCR Corp.; and Zilog, Inc.

The S-Tran translator is available for a one-time license fee of $1,500, and the runtime package costs $300 per machine. Spectrum modules are priced at $595 for general ledger; $795 for accounts receivable; $595 for accounts payable; $595 for payroll; $895 for wholesale distribution; and $995 for manufacturing.

SMI, 4009 Pacific Coast Highway, Torrance, Calif. 90505.

SAMNA CORP.
Samna Word II Version 1.1

Samna Corp. has introduced an updated version of Samna Word II, its word processing software package for the IBM Personal Computer, Personal Computer XT and compatible processors.

According to the vendor, Version 1.1 includes mail/merge and free-form line drawing and offers support for more character and matrix printers.

Samna Word II is compatible with software packages such as Lotus Development Corp.'s Lotus 1-2-3 and Ashton-Tate's Dbase II. It runs under Microsoft, Inc.'s MS-DOS Versions 1.1 and 2.0.

Version 1.1 costs $450.

Samna, Suite C-1200, 2700 N.E. Expwy., Atlanta, Ga. 30345.

UNIQ COMPUTER CORP.
Unicalq

Uniq Computer Corp. has announced that its Unicalq virtual memory spreadsheet package is now available for use with AT&T Technologies, Inc.'s 3B20 32-bit microcomputer under the Unix System V operating system.

The Unicalq system was previously available on Digital Equipment Corp.'s VAX-11 and PDP-11 series processors, according to Uniq.

A vendor spokesman said the spreadsheet system offers a user-transparent virtual memory mode in which more than 32,000 rows and columns can be used.

The spokesman said that individual spreadsheets can be linked to share data and that Unicalq includes a file encryption feature employing passwords for access to sensitive files. The Unicalq package is priced at $2,500 for the AT&T Technologies 3B20 micro under Unix System V.

Uniq Computer, 28 S. Water St., Batavia, Ill. 60510.

PERSONAL CAD SYSTEMS, INC.
Cadplan

Personal CAD Systems, Inc. has introduced a software package that gives computer-aided design capabilities to IBM Personal Computers and compatible systems.

Cadplan features menu-driven commands, including zoom, pan, copy, move, rotate, delete and undo. It is suited for two-dimensional design applications, a spokesman said.

Cadplan costs $1,200; an optional data base extraction sells for $350.

Personal CAD Systems, 15425 Los Gatos Blvd., Los Gatos, Calif. 95053.

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Jonos Ltd. plans to use 3½-in. drives in its portable computer. Several Japanese companies, including Mitsubishi Corp., began designing 3-in. drives in Japan and 3½-in. in the U.S., indicating that they don't expect 3-in. drives to be successful in the U.S.

What will happen to the non-3½-in. drives? "There is really no hope for the other formats. The 3½-in. drives will be the standard," Christiansen said.

But other analysts disagree with his assessment. "Non-3½-in. drive manufacturers are stubbornly promoting their drives," Porter said. "There is a possibility that more than one size could be adopted."

Apple's primary microcomputer rival may help provide additional sizes. "While the 3½-in. drive is clearly gaining momentum, the question remains, 'What will IBM do?' " Porter said.

Analysts linked IBM's 4-in. drive to the PCjr. Since that drive was slower, had less capacity and was more expensive than other drives, IBM dropped production plans. "IBM's 4-in. drive was a dinosaur," Christiansen said.

"I think IBM will use a micro floppy drive with its portable computer," Porter said. "I think it will be a 3½-in. drive, but I don't expect to see [it] until next year."

For users, the smaller drives bring the problem of transferring data between 3½-in. and 5¼-in. disks. "The easiest way to transfer data is with communications software," Porter said. This is easy only if one has communications software for both the computer with the 3½-in. drive and the microcomputer using a 5¼-in. drive and the knowledge, desire and time to transfer data.

Gavilan offers a $595 software and cable option that transforms 3½-in. data files to 5¼-in. files. "It is designed for the user who gathers data in the field, but uses it with a desktop computer at home or in the office," Daniel said.

Micro floppy drives will not replace 5¼-in. drives overnight, observers say. It wasn't until 1981 that more 5¼-in. drives were shipped than 8-in. drives.

PICK from page 107

the comparison ends there. Unix has built a dedicated following among programmers who appreciate its multitasking and dictionary facilities. However, Unix is not generally considered to be a "user-friendly" operating system.

Pick, on the other hand, is dictionary-driven with a relational data base manager and a query language that users say is quite appropriately titled "English."

"It's a true user-friendly system," said Dan Rothstein, senior vice-president of Addept Systems Corp., a Santa Clara, Calif.-based vendor of Pick-based applications. "Pick's executable language is mostly Basic. The user has almost no restriction on what he can access in the data base. It's a variable-length record, field and file system, and it has a very good virtual memory system. It places practically no restrictions on the size of the CPU."

Large CPUs

But that doesn't mean Pick isn't appropriate on large CPUs. The Ultimate machine, which is basically a Honeywell, Inc. DPS 6 minicomputer, contains up to 2M bytes of main memory and 1G byte of mass storage. Systems Management, Inc. (SMI) of Rosemont, Ill., also offers Pick on IBM's 4321 and 4331 processors as well as on IBM's CS 9000 multiuser workstation supporting over 21 users and up to 4M bytes of main memory.

Robert Milligan, SMI's vice-president of sales, said Pick enjoys a body of about 15,000 users and is now offered by a dozen vendors. However, he doesn't see IBM releasing its own version of Pick.

"I think they would like to promote a number of operating systems but wouldn't want to do it themselves," he said.

No matter how IBM makes the system available, Killen believes the endorsement would be a marketing coup. "The beauty of Pick is that it's got an incredible amount of software written for it," he said. "It would be a good weapon against [Apple Computer, Inc.] because so much good software runs on Pick, and Apple doesn't run Pick."

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eters. This approach is taken because the models are easier to conceptualize in this form, and the data pertaining to the parameters is more easily collected.

But other, more sophisticated, techniques are also available. Often, business data can be expressed in terms of a series of data points, ordered by time.

Several decision support languages support the ability to use time series in lieu of a single-scale value for variables.

Even more sophisticated forecasting can be obtained by using techniques such as exponential smoothing to take advantage of seasonality and autoregressive aspects of the data.

DSS from page 107

the analytical staff, due to automation of time-consuming tasks, such as report and graphics production.

The opportunity for more consistent analyses, because the analyst can exercise models for virtually an infinite variation of conditions without incurring large processing charges.

The opportunity for more efficient use of computer resources by distributing the work load between the organization's main computer and the micro workstation.

The ability to maintain data and models in a more controllable environment.

The last point is important from the standpoints of both operations and security. In the planning and forecasting areas, the ability to duplicate the results of an earlier analysis' results is very desirable, if not vital.

Further, micros can afford an additional level of security for proprietary models and data, especially when maintained in a secure office and when they lack the ability to be accessed via telephone. Sensitive data and programs can be kept on floppy disks, which can be locked up when not in use.

Despite the many capabilities of the micro, there remain several limiting factors to its use. In a decision support environment, there are four major disadvantages to using micros:

- The availability of DSS software is limited, so more sophisticated analyses must be programmed. Business analysts often develop their models in terms of a system of equations and may have difficulty translating their conceptual models to a spreadsheet program.
- Even in hard disk configurations, micros have limited disk storage capabilities, so manipulation of source data or maintenance of data bases may not be practical.
- Integration of functions is generally lacking in current micro software offerings. It is often difficult, for example, to use a word processing package and a graphics package together, due to differing file formats and/or data representation.
- The perennial problem: Users may fear, dislike or distrust computers. There are additional factors which must be taken into account when developing DSS software for micros. For example, routines that are I/O-intensive are generally slow on micros due to the lack of intelligent I/O channels.

The amount of usable memory, and thus the size of an executable module, is limited and requires the developer of large programs to use partitioning or overlay strategies.

Microcomputers offer the business analyst and decision maker a level of capability and flexibility today that was in the realm of science fiction only a few decades ago. The micro workstation affords its user a viable alternative for DSS over some mainframe processing; however, it does not come without concessions.

The utilization of mainframes for sophisticated processing, data bases, data reduction and analysis is — and will continue to be — an economical DSS solution.

Regan is a technical sales representative at Boeing Computer Services Co.

'Parlez-vous Fortran?'

COMPUTER INDUSTRY

IBM system news may erupt soon

INDUSTRY INSIGHT

BILL LABERIS
CW Senior Editor

Interesting rumblings are emanating from deep within the IBM chasm, all pointing to an unexpected announcement, perhaps in the next few weeks.

Asked about the rumblings, Charles Greco, who keeps his ear close to the ground at International Data Corp. (IDC) in Framingham, Mass., said Feb. 28 or 29 will bring a 3083 announcement, one that will put a bit more distance between the 3083 series and the 4381, announced last September but not shipped in volume yet.

Greco speculated that Big Blue will unveil one to three processors in a so-called "prime" series, namely 3083 E', B' and J', each offering 10%-plus more horsepower than the previous high-end 3083s.

Why the speculation? Greco said IBM had shut down part of its 3080 series production line in the fourth quarter, prompting two things: a slowdown in 3080 shipments and speculation that the Sierra series mainframe — the successor to the 3080 series — would be announced earlier than expected.

However, Greco said, the hounds were thrown off the true scent by this alleged action, as the 3083 enhancements are what IBM really had in mind. Growing that series at the high end would also make it possible for IBM to enlarge its 4381, upgrading to a Model 3 capable of operating in the 4 million instructions per second range, Greco said.

IDC and Greco are also calling for a February announcement of a 3420 tape drive successor, a stackable model with individual units coming in boxes much smaller than the 3420. This will be good news to Storage Technology Corp., which is believed to have its 3420 successor waiting in the wings. It will remain there until an IBM announcement so that STC can ensure that its box will have all the necessary guts to be truly compatible with the IBM version.

See **IBM** page 144

Recovery challenges vendors

By Robert Batt
CW West Coast Bureau

MENLO PARK, Calif. — The increasingly strong demand for data processing products and peripherals is bringing in its wake a new set of management problems for the leading computer manufacturers and users.

As with all economic recoveries, those problems have been made manifest particularly in the labor area, with companies which only a few months ago were cutting back on recruitment and hiring now facing an acute shortage of people.

"There is a kind of desperation in the marketplace. A short while ago, departments were hiring only one or two people in special categories. Now they are faced with hiring 10 or more people in many areas at the same time," commented Rod Asher, a DP headhunter based in Los Angeles.

A case in point is Santa Clara, Calif.-based National Semiconductor Corp. The company, which two quarters ago was reporting weighty operating losses and laying off workers, is now looking to employ 1,100 new people in its facility.

In Silicon Valley, 8,200 jobs have been added in the electronics and computer field since last April, according to state labor figures. In December alone, 1,300 people were added to the industry's employment total. Santa Clara County, which forms the heart of Silicon Valley, now has almost 175,000 — one out of four employed people — working in computer-related industries.

According to the California State Employment Development Department in San Jose, employment in the electronics area began declining in September 1982 and continued dropping for about six months. However, by the end of 1983, employment in this sector had grown by almost 4% for the year as a whole, and the department said it expects it to grow even more quickly in 1984.

Advertising is another indicator of the upswing that is taking place. The recent "Jubilee Edition" of the *Los Angeles Times*, for example, contained 450 columns of advertisements for software development engineers, IBM Cobol programmers and DP personnel, including computer operators. This was 10 times bigger than any other industry advertisement

See **JOBS** page 132

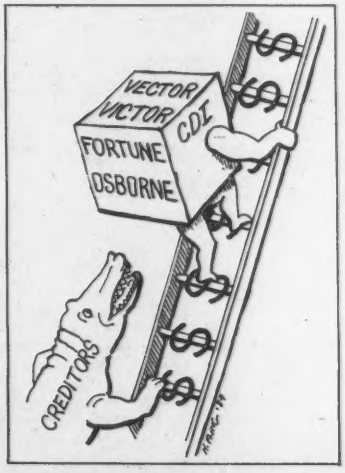
Reorganization seen way of life for micro makers

By Patricia Keefe
CW Staff

A rocky 1983, which saw at least two bankruptcy filings and heavy financial losses among a number of microcomputer vendors, has prompted a series of actions designed to right the corporate ships, including personnel overhauls at the executive level, a refocusing of marketing efforts and a search for the financial aid necessary to sustain the companies until they get back on course.

In several cases, a lack of professional management and financial accounting skills initiated the woes of the founding

See **LOSS** page 146



apple

Apple followed its recent Macintosh and Lisa introductions with a management and product line reorganization/**140**

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Amdahl's booming high-end mainframe sales fattened the bottom line in 1983/**142**

INSIDE

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JOBS from page 131

section in the newspaper.

"It has become a seller's market once again. There is a keen competitiveness for people, particularly in sectors that are automating quickly, such as the banking industry, and salary increases are once more averaging 10% to 12%. As a result, employees are gung ho and on the lookout for new employment opportunities," Asher said.

"It doesn't appear as though we have yet reached the panic hiring of four to five years ago, but it will not come as a surprise if we reach that same situation in the not-too-distant future," added Don Modie, employment manager at California Computer Products, Inc., an Orange County, Calif.-based subsidiary of Sanders Associates, Inc. and manufacturer of computer plotters, interactive graphics and digitizers.

With job opportunities increasing at a time when companies need to hold onto their people to meet the demand for their products and services, many firms are emphasizing job training and other incentives.

"The task is not only to hire good people, but to keep them here," remarked Susan Peterson, National Semiconductor's employment manager.

In a forward-looking move, the chip manufacturer has set up an employee assistance program, including the use of a resident psychologist to deal with employee relations and handle problems resulting from work stress.

Tandem Computers, Inc., the Cupertino, Calif.-based manufacturer of Nonstop computers, is well versed in the art of managing the employee problems that result from high growth. The firm, which expects to see growth this year in excess of 50%, places high emphasis on its participative management program, designed to involve employees in company decision making.

It has become a seller's market once again. There is a keen competitiveness for people . . . and salary increases are once more averaging 10% to 12%.

"We do a lot of training with our existing work force. If you want to be flexible and put a high rate of change through your organization, you had better make sure you have your act together as far as your employees are concerned," stated Lary Evans, Tandem's vice-president of manufacturing.

Seagate Technology, Inc., a Scotts Valley, Calif.-based manufacturer of Winchester disk drives, is struggling with managing the impact on its work force of high growth. In fiscal year 1982, the company totaled $40 million in sales. In the second quarter of this year alone, it expects to reap sales of $92 million.

In the last 18 months, the number of computer engineers in the company has risen from 75 to over 200. The company did this chiefly by promoting employees who successfully completed a six-month management training course set up by Seagate to improve employee skills.

As Elliott Sopkin, vice-president at Advanced Micro Devices, Inc., put it: "Firms need to provide their people with incentives. Companies have to be extremely careful that in times of high demand they do not work their people so hard that quality suffers. Ultimately, that is a management judgment."

Backlog spurring rethinking of strategy

MENLO PARK, Calif. — The strength of the U.S. economic recovery has forced many computer vendors to rethink strategies for meeting customer needs and responding to exceptionally strong order backlogs.

In several companies, this has resulted in a restructuring of internal procedures and organization to a greater or lesser degree. The companies that are now reaping the best rewards are often those that used the recent recession to make changes that would allow them to take advantage of the upturn when it came.

Advanced Micro Devices, Inc., (AMD) for example, recently entered the top-10 list of semiconductor manufacturers, with sales in the year ended March 31 expected to be around $560 million, compared with $358 million in fiscal '82.

Anticipating annual revenues of $1 billion within the next two years, AMD can attribute its success in no small part to a far-reaching employee relations policy designed to involve its work force more at a time of exceptional growth.

In 1982, AMD carried out a major restructuring of its operations with an emphasis on decentralization. The company was split into five major operating divisions and 13 major production lines, called directorates. "Our concept was to keep the manufacturing groups small so that we could keep the entrepreneurial spirit alive and have each directorate run its own business," explained Elliott Sopkin, AMD vice-president.

A similar approach was followed by Seagate Technology, Inc., a manufacturer of Winchester disks based near Santa Cruz, Calif. The company, which employs around 3,000 people, split itself into different modules with each module having its own plant and production control manager as well as group leaders and supervisors.

Seagate also developed offshore facilities for the labor-intensive part of its operations, such as the testing and repairing of integrated circuit boards. In July 1982, the company opened up a plant in Singapore to be followed one year later by a fa-

See NEED page 136

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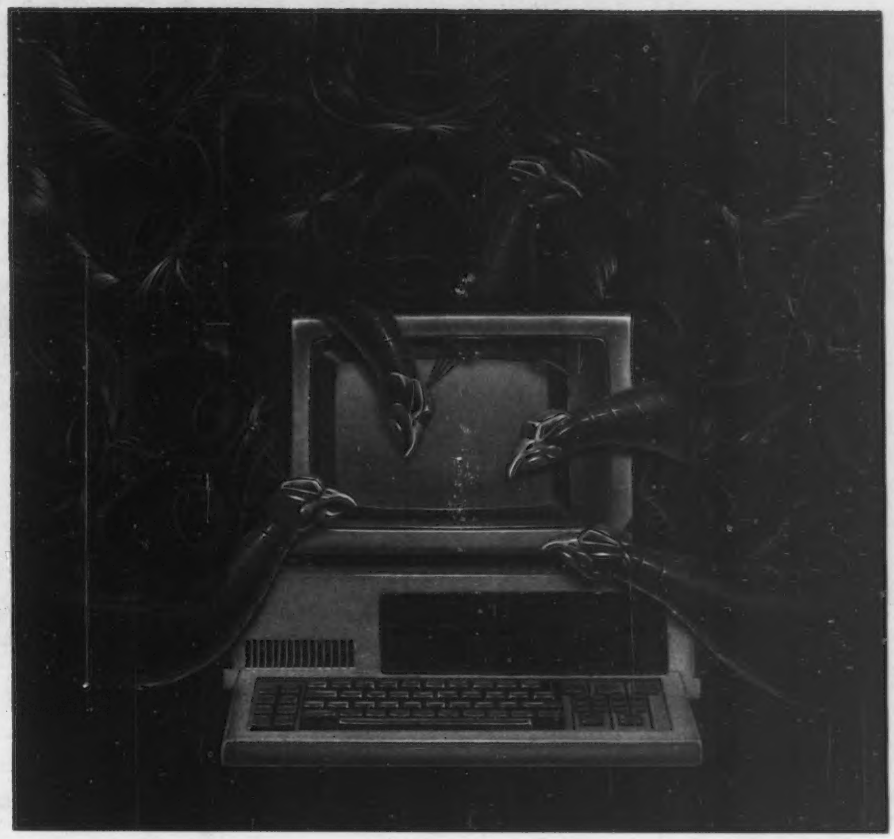

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FORECASTS AND FINDINGS

Micro software decline

Overall declines in the unit shipment and dollar volume growth rates of the microcomputer software market are likely as vendors integrate existing package functions into more comprehensive functions and develop increasingly user-friendly operating systems, according to a report by International Resource Development, Inc. (IRD).

"Microcomputer Software Packages" predicts that more comprehensive packages, such as the increasing availability of multiple window screens and mouse cursors, will reduce unit shipments and average software expenditures per micro. It also predicts that improved operating systems will allow users to perform a wide range of processing tasks for which they previously would have had to make additional software purchases. Even with a slowdown in growth relative to the expansion of hardware sales, the software market is expected to increase from $1.6 billion in 1983 to $14.7 billion in 1993, an annual growth rate of 25%, IRD claimed.

Other changes predicted by the report include more distinctive usage patterns and distribution structures to serve business, home and educational markets; software increasingly supplied in bulk lots by systems vendors and by distribution organizations; and a shift in the home market away from specialized stores to more general types of retail outlets.

The 272-page report is priced at $1,650 from IRD at 30 High St., Norwalk, Conn. 06851.

Micro graphics strong

The growth rate for microcomputer-based graphics products will grow at a 28% compounded annual rate through the first half of this decade to a 1985 shipment value in the U.S. of over $6 billion, but the market also faces a number of hindrances in that development, according to a recently released report from Strategic, Inc.

The research study, "Microcomputer Graphics: Impact and Opportunities," predicted that severe price erosion by 1985 will paralyze many micro graphics vendors and that business applications will surpass computer-aided design (CAD) as the leading market segment, with mechanical CAD applications maintaining a 32% annual growth rate, but with electronic CAD applications growth slipping from its 73% rate through 1980 to 25% per year between 1981 and 1985.

Hindering the growth of the market, according to the report, is the lack of software and skilled development programmers, the lack of sophisticated data base management systems and the lack of business user understanding about what computer graphics can do.

The report is available for $950 from Strategic through P.O. Box 9747, San Jose, Calif. 95157.

Shipments to perk up

Growth of worldwide computer system shipments by U.S. vendors will increase in dollar value by only 11.5% in 1983, down from 15.1% in 1981-1982 and 19.1% in 1980-1981, but will perk up in 1984 to 13.3% as total shipment values grow from the $30.2 billion posted in 1980 to $52.5 billion in 1984, according to a recent study by Venture Development Corp.

"The U.S. Computer Industry," second edition, forecasts shipments of virtually all major computer products and predicts that general-purpose mainframe shipments, which represented nearly two-thirds of total computer system sales in 1980, will only represent half of total shipments in 1984. Superminicomputer shipments will grow from $857 million in 1980 to $2.9 billion in 1984 with new vendors entering the fray, existing vendors expanding product lines and prices falling dramatically; however, minicomputer shipments, while

growing at a larger rate in 1983 than 1982, are in a permanent slowdown, according to the report.

Single-user personal computers priced under $10,000 will see business segment shipments grow at an annual rate of 10% to a value of $700 million in 1984, and shipments of portable computers will grow at a "phenomenal" rate to double in 1983 and almost to double again in 1984 to reach nearly $1 billion.

The 200-page study is available for $1,050 from Venture Development at One Washington St., Wellesley, Mass. 02181.

Power balance shift

Distribution strategies spawned by the microcomputer revolution will echo throughout the office products industry in this decade and result in a shift in the balance of marketing power from the manufacturers toward the new distribution establishment, according to a recent study by Frost & Sullivan, Inc.

More intense competition for new markets, created by improving performance/price product ratios, has forced vendors to seek indirect distribution channels to supplement or even to replace their traditional sales forces, the study said. Leading the way have been microcomputers for office use as vendors try to reduce marketing costs while reaching a broader base with cheaper products. OEMs and systems-house sellers are emerging as a major third force, powered by expertise and customer support commitment.

The sales of stand-alone micro sales through dealers should increase from 15% of the total in 1982 to 25% in 1987, and nondirect channels will increase their combined share of workstation micro sales from 20% to 45% over the same time span, the report declared. The report forecast equipment distribution in the areas of word processors, copiers, dictating equipment and communications equipment.

"New Marketing Strategies for Office Equipment" is priced at $1,325 and is available from Frost & Sullivan at 106 Fulton St., New York, N.Y. 10038.

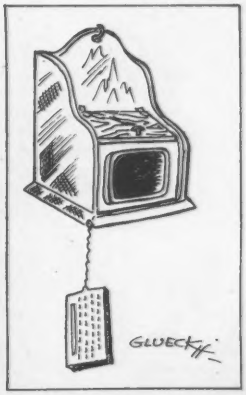
Productivity climbing

Two studies on the computer industry indicate that the number of employees in the industry is growing at an annual rate of 3%, and productivity over a three-year period has increased by 7%, while total corporate operating costs and expenses have grown at a lesser rate than gross income.

"Productivity Trends in the U.S. Computer Industry," based on analyses of 86 companies over a three-year period, and "Computer Industry Comparative Costs Analysis," covering the years 1980 through 1982, are contained in the October 1983 update of "Corporate Strategies for the U.S. Computer Industry."

The studies, completed by Newton-Evans Research Co. (Nerc), in addition to information on productivity, profits and expenses, also analyze cost of goods sold, marketing costs, R&D costs, total working capital, sales revenue and gross income. The second report indicates that total operating costs and expenses rose an average of 7.5%, while gross income grew an average of 9%. Also, growth in investment for R&D remains high and just about matches computer industry sales growth for both 1981 and 1982.

Priced at $850, the 1983-1984 edition of the corporate strategies publication analyzes the 100 leading computer industry firms and is available from Nerc at Suite 204, Bethany Forty Center, 10176 Baltimore National Pike, Ellicott, Md. 21043.



DP boom means overtime, more shifts, facilities

MENLO PARK, Calif. — More overtime, extra shifts and new manufacturing facilities characterize the computer industry enjoying boom times, which it is now.

Intel Corp., Advanced Micro Devices, Inc. (AMD) and California Computer Products, Inc., a subsidiary of Sanders Associates, Inc., are examples of companies that are attempting to meet the demand for their products through expanded production facilities.

Intel, for example, will open up two new plants this year, one in Albuquerque, N.M., and another in Jerusalem. The company is presently operating multiple shifts six and seven days a week.

Intel, which overestimated the semiconductor market in the spring of 1982 and hired many more people than it needed, retained the loyalty of its work force by keeping its people on its employee rolls when the market slowed. It did so by cutting salaries across the board. But when the economy picked up steam, Intel did not have to scramble for new hires, as did virtually all of its competitors, which experienced extensive layoffs during the recession.

Rival chip manufacturer AMD has instituted a "job for life" policy, similar to the Japanese lifetime employment system. With a guaranteed no layoffs system, the rapidly expanding company has been able to win employee approval for a production strategy based on more capital equipment and higher yields.

The company recently brought on-line a new factory in San Antonio, Texas, specializing in the manufacture of bipolar devices and a new Cmos fabrication plant in nearby Austin, Texas.

Among the semiconductor manufacturers in particular, booming demand has resulted in an increasing amount of overtime for company employees.

"Many companies are paying out a lot in overtime payments. During the recession, firms were generally running just two shifts and stretching out deliveries. Now most of them are running three shift patterns, seven days a week," commented Bill Strauss, vice-president of Integrated Circuit Engineering Corp., a Scottsdale, Ariz.-based market research firm.

According to Tom Mitchell, president of Seagate Technology, Inc., such a fast work pace can often lead to problems. "You cannot work people seven days a week for a long period of time. Overtime has to be a short-term phenomenon; otherwise, quality will drop off," he warned.

National Semiconductor Corp. has attempted to get around this problem by changing shift patterns and giving employees more flexible work hours.

NEED from page 132

cility in Bangkok, Thailand.

At Tandem Computers, Inc., the approach was not so much one of organizational restructuring as an attempt to improve already existing procedures.

Emphasis was placed on gaining better control of materials supply, achieving a $15 million reduction in inventories and a $69 million increase in the year-end cash balance in 1983.

At Hewlett-Packard Co., a fundamental change in the firm's business, emphasizing more software development and relatively less manufacturing, has increased the need for high productivity levels.

At its data systems division in Cupertino, Calif., and at its Boise, Idaho, plant, HP has installed automated warehouses to increase productivity and replace jobs HP considered dangerous or dirty for humans.

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Nobody puts ideas on paper so many ways.

Comshare's Kevin Kaikhoven and Richard Crandall hold graphics showing System W's integration into a typical information center.

Comshare changes strategy
And wins IBM support

By Paul Gillin
CW Staff

ANN ARBOR, Mich. — For Comshare, Inc., the Big Blue blessing it received last month in the form of a "complementary marketing agreement" with IBM could not have come at a more opportune time.

The agreement provides for IBM salesmen to recommend Comshare's System W as the primary decision support system (DSS) for IBM mainframes [CW, Jan. 9]. The deal is an important lift for Comshare, which has experienced more troubles than most of its peers in the time-sharing industry recently. Its revenues, which reached almost $80 million in 1981, slipped to $76 million in 1983. Between 1981 and 1982 its income per share from continuing operations plunged a precipitous 85%.

However, the company now stands to be counted with the top DSS vendors in the industry, a turnaround which is attributable to a refocusing act Comshare performed in 1979. Prior to that, the firm offered a variety of statistical, data management and modeling packages on time-sharing, but nothing called DSS.

"Toward the end of the 1970s, we found the products we were delivering were not allowing users to keep pace with the productivity benefits they had achieved during the mid-70s," said Richard Crandall, Comshare president. "It turned out that the kinds of requests we were getting were broadening. People were asking more from decision support."

The decision to become a DSS vendor was the result of three primary observations, Crandall said. "We saw that buying software was becoming the accepted thing to do," he said. "We saw Apple [Computer, Inc.] was in the home market and was going to have a significant impact in the corporate area. We also saw that software for decision support and financial management was getting old."

Comshare outlined a two-part strategy to develop a new set of integrated DSS software and a delivery mechanism that emphasized time-sharing as well as packaged sales.

Built from scratch

System W was built from scratch, with an initial investment of $10 million. The company continues to invest about $5 million per year in enhancements and new features like Micro W, a microcomputer version of the mainframe product, released in early 1983.

Comshare also saw a three-tiered delivery strategy as central to System W's success. The product is offered on time-sharing, as a package available on the mainframe and as Micro W. Several of Comshare's largest accounts are using all three delivery methods, Crandall said.

Interestingly, System W's success has marked a rebirth of Comshare's time-sharing business, Crandall said. "Our time-sharing business associated with System W has never been better. Companies are buying the idea of triple delivery."

What has changed is Comshare's image of itself. The company bills itself as a DSS vendor, but has expanded the definition of DSS to include "basically everything that's in the information center," Crandall said.

Comshare also refuses to be pinned down on the future of the time-sharing part of its business, preferring to focus on the product rather than the medium of delivery. In fact, Crandall regards time-sharing as elemental to the three-tiered delivery strategy. More products that are available as a remote service now will be packaged in the future.

"We have set ourselves up so that we are indifferent to whether a customer decides to go with a software sale or time-share. We literally don't care," he said.

MAI goes to court to prevent stock takeover

By David Myers
CW New York Bureau

NEW YORK — Management Assistance, Inc. (MAI) has struck back against dissident shareholder Asher B. Edelman, suing to keep him from using his 7.5% stake to wrest control of the company.

MAI, maker of the Basic Four line of minicomputers, filed suit against Edelman and six codefendants in U.S. District Court here late last month.

MAI has asked the court to award it an unspecified amount of damages and to prevent Edelman and what the firm called "his group" from adding to their 7.5% stake; voting at the March 14 shareholders' meeting here; selling the stock; using it to attempt to control company management; or "taking any other steps in furtherance of their unlawful scheme to gain control of MAI," according to court papers.

Plans to nominate directors

Edelman has said he will present a slate of nominees for the computer maker's board of directors at the March shareholders' meeting, seeking to get MAI to drop out of manufacturing and to concentrate instead on its more profitable service business.

Named along with Edelman in the complaint were Arbitrage Securities Co., Plaza Securities Co., Minor Associates, R. Raymond French, Charles P. Stevenson Jr. and Clark R. Mandigo.

French, Stevenson and Mandigo are on the slate of board nominees put forward by Edelman.

In its complaint, MAI charges Edelman and the six codefendants with stock price manipulation, racketeering and breaking securities laws.

MAI said in a prepared statement that it was accusing Edelman and the six others of obtaining funds for MAI stock purchases by misleading investors into believing that the sale of an Edelman-controlled commercial real estate firm was imminent, driving up the price of that company's stock and providing Edelman with financial leverage to borrow money for his stock purchases.

Reached at his offices here, Edelman said the MAI lawsuit was "totally without merit and totally without truth." He said the case would not tie his hands. "They have to win before they can tie my hands," he noted.

Even if its case were a success, MAI would be unlikely to win an injunction against his buying more stock or selling the stake he has, Edelman added.

Corona, IBM settle on law suit

LOS ANGELES — Corona Data Systems, Inc. announced it has settled a copyright infringement suit brought by IBM by agreeing to a court-entered stipulation order and judgment in which it is enjoined from infringing upon IBM copyrights and ordered to return to IBM or destroy any existing copies of the computer program in question.

Corona Data agreed to the settlement without admitting liability, and IBM agreed not to seek enforcement of the judgment with regard to microcomputers shipped by Corona Data prior to Feb. 18.

Corona officials said they are confident their engineering staff will be able to develop an IBM-compatible program that does not infringe upon IBM copyrights.

Apple reorganization reflects new product strategy

CUPERTINO, Calif. — Apple Computer, Inc. recently announced the reorganization of its product line families and executive sales management to reflect newly implemented product strategies and priorities heralded with the recent announcements of a line of 32-bit microcomputers.

President and Chief Executive Officer John Sculley said Jan. 30 that the reorganization was effective immediately and resulted in three product divisions: the Apple II division, the Apple 32 division and the Accessory Products division.

The Apple 32 division will include product development and marketing for the Macintosh, the Lisa 2 series and all 32-bit systems. Steve Jobs, company chairman, was named executive vice-president responsible for the division, which includes the automated Macintosh manufacturing facility in Fremont, Calif.

Named to head the Apple II division, with responsibility for all present and future Apple II and Apple III products, was Delbert Yocam, formerly vice-president and general manager of operations.

The Accessory Products division retained Michael Muller as vice-president and general manager of the division, which designs, produces and procures products such as printers, modems and keyboards.

Each product family will include manufacturing operations for that product group, Sculley said.

"Future products will be designed in cooperation with manufacturing, assuring high-quality products that are easily and economically produced," he said.

E. Floyd Kvamme, executive vice-president for worldwide marketing and sales, announced three changes in the company's executive sales management: John Cavalier, formerly head of the personal computer division, was named vice-president of the Americas, Far East and Africa group; Michael Spindler, former European general manager of Apple, was named vice-president of the European group; and William Campbell, formerly vice-president of marketing, was named vice-president of U.S. sales.

Interconnect seminar set for March 22

ORLANDO, Fla. — "Interconnect Japan," a seminar for the discussion of successful strategies for penetrating the interconnect market in Japan, has been scheduled here for March 22-23 by Technology Analysis Group, Inc.

The seminar will bring together U.S. telephone equipment manufacturers and top Japanese and U.S. telecommunication and trade experts and will cover topics such as the structure of the market, projected demand for different types of equipment, export financing, legal aspects of exporting to Japan and others.

Speakers will include Clyde Pretowitz, counselor to the U.S. Secretary of Commerce; Hideaki Toda, director general of the New York office of Nippon Telegraph and Telephone Public Corp.; Masaru Kawajiri of the U.S. Embassy, Japan; Kan-Ichiro Aritomi, first secretary, Embassy of Japan; and Robert D. Westfall, vice-president of the Security Pacific National Bank Trade Finance Group.

The registration fee is $900 for the first person from a company and $450 for each additional person. More information is available from Technology Analysis Group, Suite 101, 1424 16th St. N.W., Washington, D.C. 20036.

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IT ALL ADDS UP.

COMPUTER INDUSTRY

Industry reps back bill for overseas tax treatment

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Computer and electronics industry representatives have endorsed legislation to restructure the U.S. program offering favorable tax treatment to American export sales.

The bill would replace the existing Domestic International Sales Corporation (Disc) program, set up to allow tax deferrals on export revenues, with foreign sales corporations (FSC). Members of the General Agreement on Tariffs and Trade have complained that Disc violates that treaty, to which the U.S. is a signatory.

Several spokesmen for various segments of the U.S. high-technology community testified on the bill Feb. 3 before the Senate Finance Committee.

Although they insisted the Disc program has been beneficial to industry and that some sort of tax relief is necessary if American exporters are to remain competitive with foreign firms that receive tax benefits from their governments, the industry representatives offered a number of recommendations for amending the legislation, now under consideration in the U.S. Senate and House of Representatives.

Intel Corp. Vice-President Robert Reed, representing a newly formed High-Technology FSC Coalition, told the Senate committee the FSC act should clarify the current ambiguity regarding eligibility of software sales to receive tax treatment as "export property."

Sperry Corp. Vice-President Gerald K. Howard explained to the committee that under Disc rules software that is bundled with hardware is eligible for the tax benefits, but the eligibility is unclear if the software sold under a separate price is in a separate transaction.

In general, Howard said, "The current Disc provisions have been a most effective incentive for small as well as large electronics companies to begin and expand their export activities."

Appearing for the American Electronics Association, the Computer and Business Equipment Manufacturers Association, the Scientific Apparatus Makers Association and the Semiconductor Industry Association,. Howard said the groups support the FSC bill even though it might mean reduced tax benefits for electronics companies on exports.

Howard offered a number of recommendations for the legislation that, he said, would make the overall package attractive to high-technology companies.

Amdahl reports earnings climb to $43.2 million

SUNNYVALE, Calif. — Amdahl Corp. announced recently that earnings for the fiscal year ended Dec. 31 climbed almost tenfold to $43.2 million, or 96 cents per share, from the $4.8 million, or 12 cents per share, reported a year earlier.

The company experienced record fourth-quarter revenues of $225 million, compared with $145.5 million for the corresponding period a year earlier, and net income of $15.6 million, compared with the year-earlier figure of $774,000 before application of a $1.9 million extraordinary credit.

The quarter report reflected continued improvement in product shipment volume and reduction in product costs, despite the impact of foreign currency exchange rates and processor price reductions reported in the third quarter of 1983, according to Amdahl President John C. Lewis.

Total profit for the year, after the credits realized from subsidiaries' prior years' accounting losses and tax credits, was $46.4 million, or $1.03 per share, compared with $6.7 million, or 16 cents per share, for the previous year.

Nippon invites U.S. to forum

TOKYO — Nippon Telegraph & Telephone Public Corp. (NTT) is inviting participants from the U.S. to the International Symposium on Optical Communication Technology to be held here April 12-13.

The symposium is in accordance with a U.S.-Japan trade agreement regarding NTT's procurement procedures.

The symposium costs approximately $190. Simultaneous translation between English and Japanese will be provided.

More information is available from Kazunori Yoneno, NTT, Room 2905, 200 Park Ave., New York, N.Y. 10166.

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Study hails 1983 as banner year for buy-outs

But consultant reports more conservative numbers

By David Myers
CW New York Bureau

NEW YORK — Acquisitions involving software and computer services firms topped the $1 billion mark for the first time last year and soared 132% over the 1982 total, according to the year-end index of the Association of Data Processing Services Organizations, Inc. (Adapso).

A record 146 mergers and buy-outs valued at $1.01 billion took place in 1983, according to the index prepared for Adapso by Fort Lee, N.J.-based Broadview Associates, an acquisitions marriage maker.

George Grodahl, a Broadview partner, hailed 1983 as "a banner year" for buy-outs in the software and remote processing segments of the computer industry. The dollar value of the deals rose for the fourth straight year, "a trend we expect to continue in 1984. There may be a 15% increase this year," Grodahl said.

However, more conservative numbers and forecasts were handed in by the Cerberus Group, an independent consultant based in Frenchtown, N.J. The firm's year-end report found that acquisitions and mergers in 1983 added up to $956 million, a gain of 45% from the $660 million total of 1982. A "slight improvement" was predicted by the Cerberus Group for 1984.

The largest single deal of last year was IBM's increase of its stake in Intel Corp. to the tune of $155 million, according to the Cerberus Group.

But the Adapso/Broadview index, restricted to the nonhardware marketplaces in the computer industry, located the largest deal in Comdata Network's $91 million purchase of rival electronic funds transfer firm Instacom.

'The most active acquirers were companies that were already in the industry. Almost every major computer company has made acquisition a major part of [its] growth strategy.' — George Grodahl, Broadview Associates partner.

"The most active acquirers were companies that were already in the industry," Grodahl said. "Almost every major computer company has made acquisition a major part of [its] growth strategy."

However, Broadview expected to see an increasing number of noncomputer companies enter the market via acquisition in 1984. Consumer goods makers, insurance firms, publishing houses, distributors and financial institutions were named by Grodahl as likely computer entrants this year.

Software deals outstripped processing company deals in 1983, according to the Adapso/Broadview index. Sixty percent of the companies acquired last year were software developers, compared to "well under" 50% in 1982, Grodahl said.

"This is a clear indication of the importance placed on the software sector and of the shift in emphasis away from the processing sector," Grodahl said, adding that Broadview expected to see software deals dominate computer industry acquisition activity again this year.

Of the software firms acquired by larger companies in 1983, 27% were developers of mainframe programs, up from 8% the year before. Microcomputer software houses accounted for 17% of the deals, a jump from 6% of the acquisitions in 1982.

Grodahl said the smallness of the micro software percentage of deals masked their relative importance last year. "That industry is still quite young and evolving. We expect that trend will become even more important in the future. This is probably one of the fastest growing of all industries," he said.

Buy-outs involving micro software houses will become increasingly common because of what he called "the Lotus syndrome," Grodahl said. "[Lotus Development Corp.] changed the ground rules when [it] entered the market.

"It spent between $3 [million] and $5 million in advertising and almost immediately established brand name identity."

But the Broadview partners do not expect computer hardware manufacturers to be among the bidders for software houses. While hardware makers might be expected to view software development as a way of keeping their machinery from becoming a mere commodity item, they might also fear that acquiring a software house would scare off independent program developers, the Broadview partners suggested.

IBM from page 131

One look at the figures posted last week by Compaq Computer Corp., maker of the most successful IBM Personal Computer lookalike, will erase all doubt that the fully compatible route is a safe one, for the time being. Compaq earned $4.7 million in its first year of operations on $111 million in sales, but sold $52 million and earned $5.2 million in the fourth quarter.

Compaq's Plus computers are about as IBM-compatible as computers can be. From the commencement of shipping its systems, the Houston-based manufacturer has hitched its cart to the insatiable appetite for IBM Personal Computers and IBM's corresponding inability to meet the demand.

But will Compaq's fortunes be short-lived? If they are not to be, the company will have to develop a solid follow-on, because IBM will not sit by idly when there's more business to be had.

The flip side of the microcomputer fortunes coin was shown by Vector Graphic, Inc. this month, when the company posted its fourth consecutive losing quarter.

This time the figures look almost pathetic — $1.9 million in losses on just $3.3 million in sales, compared with sales of almost $12 million for the same period a year ago.

Exactly what the new management group at Vector intends to do to restore the company to financial viability is not clear yet.

COMPUTER INDUSTRY

Wage exemption upheld

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. District Court here last month ruled against organized labor and supported a U.S. Labor Department decision exempting federal computer and other high-technology equipment maintenance contracts from government-set minimum wage rules.

The AFL-CIO and eight other unions challenged the Labor Department Service Contract Act (SCA) exemption in December. The department had finalized the exemption the month before, saying the act, designed to stop wage busting by government services vendors, should not apply to electronics industry workers, who are relatively well paid and whose skills are in such demand that they can command fair compensation without government protection [CW, Nov. 14, 1983 and Jan. 16].

The electronics industry had sought the exemption, arguing the law would ruin its merit pay scales and force it out of government service work. Federal purchasing and auditing agencies also backed the exemption, saying that bringing this type of work under the SCA could make it hard for federal offices to obtain high-tech maintenance services.

In his decision favoring the Labor Department, Federal District Court Judge Oliver Gasch supported the electronics industry contentions: "A number of facts led to the conclusion that this class of employees did not need the protection of the SCA and were not, in fact, subject to the kinds of difficulties Congress sought to protect against in the SCA."

The order said the industry is "not conducive to wage busting" and noted wages in this sector had not declined during the four years prior to the final Labor Department ruling in November, during which time an interim exemption was in effect.

The judge also pointed out that the final regulations provide that workers on government contracts must receive pay equal to that of workers in private organizations.

To the labor unions' complaint that the exempting regulations were "capricious and arbitrary," the court found that "the scope and content of deliberations preceding the promulgation of the final regulations . . . indicate that the regulations were the product of reasoned consideration of available alternatives."

The unions are expected to appeal the court's decision.

Pactel to offer DG's CEO in Nev., Calif.

WESTBORO, Mass. — Data General Corp.'s integrated office automation system will be marketed in California and Nevada by Pactel Communications Systems, a subsidiary of one of the regional holding companies created with the breakup of the Bell System, it was announced last week.

A subsidiary of the Pacific Telesis Group, Pactel Communications will market DG's Comprehensive Electronic Office (CEO) systems on the Desktop Generation microcomputers and Eclipse MV series of superminicomputers, according to a joint announcement. Pactel currently provides telephone terminal devices and other communications equipment for Pacific Telesis customers and serves an area with more than one million businesses.

The companies said the CEO systems may be linked through Northern Telecom, Inc.'s SL-1 private branch exchange, which is also offered by Pactel, and will provide a means to connect workstations to host computers.

LOSS from page 131

entrepreneurs, many of whom had sound products to market, but either failed to recognize the impact of IBM announcements on their market or simply mismarketed the products, according to analysts.

■ Osborne Computer Corp. was the first of several micro makers to encounter serious problems, taking refuge under Chapter 11 of the Federal Bankruptcy Act in September 1983. Prior to filing for protection, company founder Adam Osborne attempted to reverse his misfortunes by hiring Robert Jaunich II, former president of Consolidated Foods Corp., as company president and then laying off all but 80 employees.

Under a reorganization plan, Osborne Computer said it will focus on international sales, which reportedly have been consistently high. If the plan is approved, Jaunich would be replaced by Ronald J. Brown as president and chief executive officer (CEO) of the firm. Brown was general manager of Osborne's International Division. Jaunich would remain on the board of directors, as would Osborne. The company lists 27 employees, where it once had 1,000 and reportedly has enough computers to sell through the end of 1984.

■ Computer Devices, Inc. (CDI) was the second portable micro vendor to run for protection under the federal bankruptcy code last year. A major portion of the blame for CDI's problems lay with its decision to equip its non-IBM-compatible micro with non-industry-standard 3½-in. disk drives, analysts have said. Resulting financial troubles forced the company to hire a financial services firm to help locate a merger partner. When that failed, it too filed for bankruptcy.

It introduced an IBM-compatible version of its DOT portable, the DOT II, at Comdex but lacked the funds to manufacture and distribute it. Currently, CDI President Robert Moore is trying to negotiate large orders from dealers, major retail chains and large end users. Moore has said he will consider a private-label deal as well. Also, CDI announced in January that it has sold nonexclusive rights to this version of the DOT to Prime Computer, Inc. for $200,000.

A possible boost to CDI's pioneering efforts with the 3½-in. disk drive may come from Hewlett-Packard Co. and Apple Computer, Inc., which have announced personal computers using the mini-size drives that store twice the density of standard 5¼-in. disks. CDI will submit a business reorganization plan in March.

■ Vector Graphic, Inc., vendor of small business computers, has undergone several management changes in the last year, shifting founder Lore Harp in and out of the president's office. Most recently Harp bowed to pressure from a group of investors which insisted on new management in return for $2 million in financial backing.

Recently reported second-quarter losses totaled $1.8 million on sales of $3.3 million — less than one-third of sales during the same period a year ago.

Harp has been replaced by one of the investors, Jean Deleage, who has also become acting chief financial officer. Harp reportedly will concentrate on sales and other operational activities.

■ Victor Technologies, Inc. also saw some some traffic in the president's office, as President and CEO Charles Peddle stepped aside in November and was replaced by Richard Couch, former vice-president. Victor closed down the majority of its U.S. sales offices by November 1983, prompting speculation that the financially troubled micro maker had given up on the U.S. market. Analysts have blamed its troubles on too rapid expansion, poor management and a poor showing of the Victor 9000 in the IBM-dominated U.S. market.

■ Fortune Systems Corp., maker of Unix-based multiuser microcomputers, lost $1.9 million in its third quarter. Its problems have been attributed to delays in development and shipment of revised versions of its software. President Gary Friedman resigned in October, and senior vice-president of operations David Caplan was tapped as acting CEO until James Campbell was appointed president and CEO.

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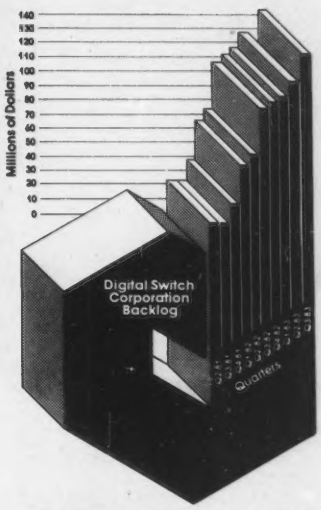

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Graphics Programmer/Analysts. One of San Diego's premier graphics software firms has several positions available for individuals with a background in FORTRAN. To **$35,000.**

MVS Systems Programmer. Large San Diego based organization seeks a professional to assist in the upgrade to MVS utilizing multi-CPU's and a large network of terminals. The company is one of the most stable organizations in the San Diego area, yet one of the most progressive in keeping up with state-of-the-art technology. To **$40,000.**

IBM Systems Programmer — Customer Support. A national computer manufacturer is seeking several additional Systems Programmers to staff their growing San Diego facility. Individuals with experience in IBM DOS or OS operating systems preferred. To **$38,000.**

Product Sales/Marketing. Exciting chance to work for leader. San Diego software firm seeks person with 5 years marketing and strategic planning experience. Prefer exposure to micro and system software industry. To **$45,000.**

Oregon

Programmer Analyst — Minicomputers. New development group has recently created positions for Programmer Analysts with solid background in BASIC language and the PICK operating system. Will develop new on-line applications for Order Entry, Financial and Inventory on minicomputers and then support field installation. Very creative environment in Portland. To **$32,000.**

Systems Programmer — Unix. Design and Develop next generation of hardware/software for expanding hi-tech firm in Portland. Will lead design effort using the Unix operating system for a product that supports graphics, databases and multiple peripheral devices. To **$50,000.**

Programmer/Analyst — New Development. Work on the development of new on-line applications for a solid and well established Portland manufacturing and distribution firm. Two–three years COBOL and one year CICS helpful. To **$34,000.**

Software Engineers — New Product Development. Newly formed division of a solid, Portland-based, high tech electronics firm engaged in design and development of Engineering Work Stations, has current positions for software engineers. Positions exist in graphics applications, data base applications, I/O interfaces, and diagnostics: Software Engineer with Unix "C" in particular demand. To **$45,000.**

Senior Programmer/Analyst — New Development. Portland financial institution has new expansion position for person with four years or more COBOL and one year experience with IMS data base. First project in this very progressive and state-of-the-art environment is as team member to implement a new Deposit System. Any exposure to on-line helpful. To **$36,000.**

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Programmer/Analyst — DEC Assembler. Excellent career opportunity for an individual with skills (two or more years) in DEC Assembler language. Will work on development of new business applications as well as support existing applications in a nationwide network. Creative environment in an expanding Portland-based firm. To **$28,000.**

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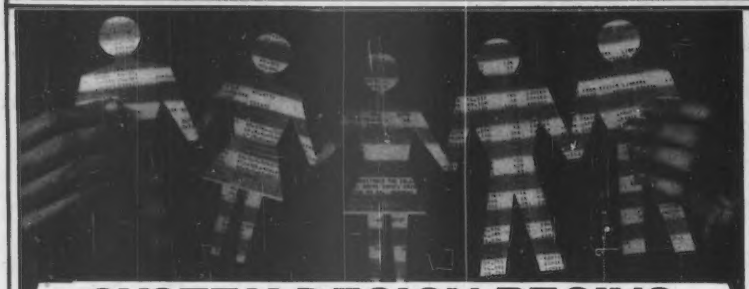

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We're integrating the personal computer with our remote computing services...continuing to develop our IBM VM MVS 3081/3033/4300 environment for large business users...refining our IBM and Honeywell based telecommunications systems... expanding our library of over 2,000 proven software packages...exploring new applications in the value added private, local and distributed networks and in office communications... developing new international financial and transportation services...and supporting these efforts with state-of-the-art quality assurance, client service and training, and administrative support. Contact: Rockville,MD.

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HARDWARE DESIGN ENGINEERS

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AFFILIATE OF MOORE FINANCIAL GROUP

DIRECTOR,
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Qualifications: Minimum of a Bachelor's Degree with a Master's Degree preferred. Knowledge of an administrative computing environment is required. The ability to relate to and work closely with management personnel is essential. Technical computing expertise and management experience are essential. Must have demonstrated verbal, written and interpersonal skills. Preferably not less than three years management experience managing large project implementation on a mainframe system in a database, on-line transaction environment. University experience is desirable.

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Specifics: This is a 12-month position. Salary range - high thirties to low forties, depending on experience and qualifications. Position available May 1, 1984. Application deadline March 16, 1984. To apply please send a resume and a list of three references to:

Search Committee,
Director Administrative Computing
Executive Director of Computing Facilities
Northern Illinois University
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If you want to join a company with exciting challenges, we welcome your resume: **FLOATING POINT SYSTEMS, INC., P.O. BOX 23489 EET-20, PORTLAND, OREGON 97223.** If you have questions, call **BOB CLAY at 1-800-547-5627.**

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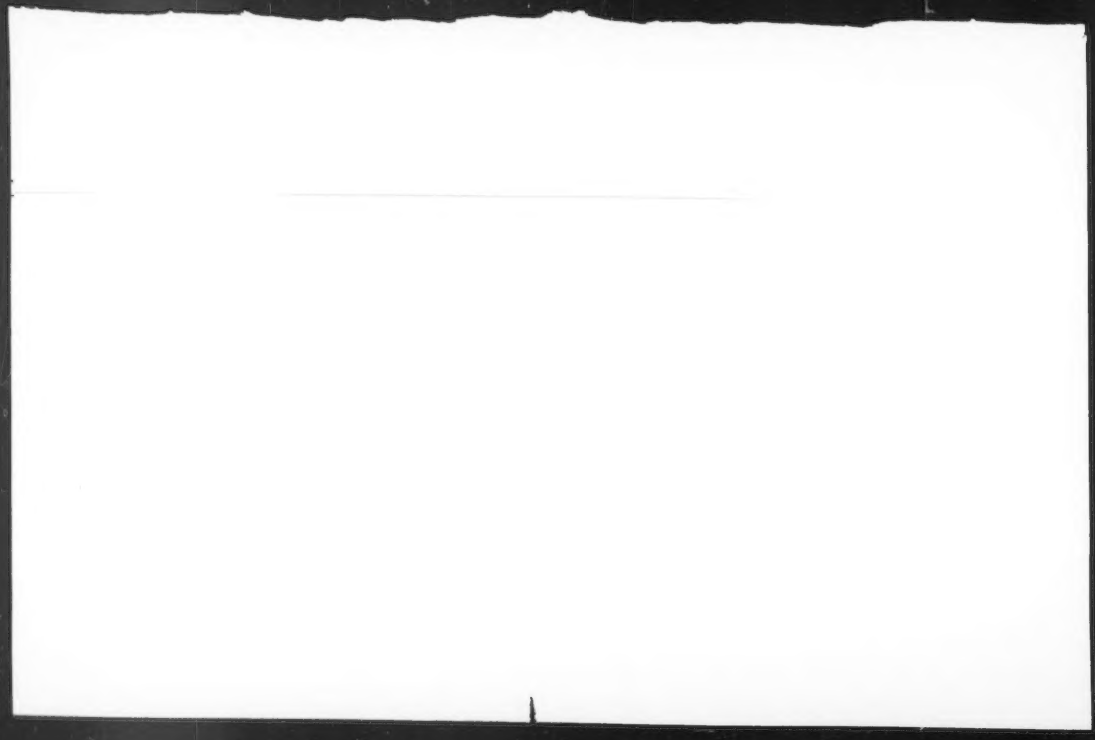

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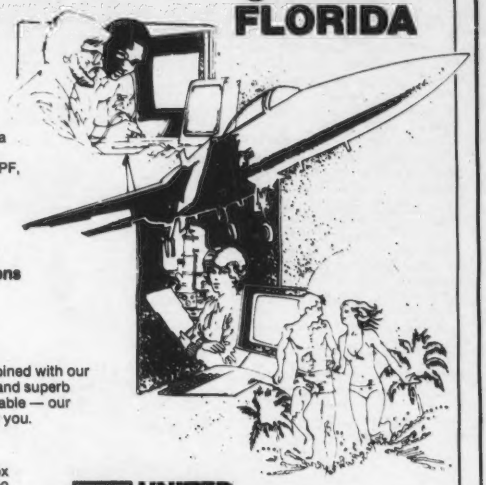

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
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ADP COORDINATOR

- for 3000-bed health care system in Ohio to serve as Senior Program/Systems Analyst to establish and maintain a new state-of-the-art ADP system. Must have specific knowledge of nimi-computers, DEC hardware, operational systems, MUMPS and other application programming languages. 3 yrs. experience in a computer field such as computer specialist or ADP system design. Salary based on experience. Benefits: Mederal retirement plan, group health/life insurance, sick leave, vacation leave, 9 paid holidays/year. Contact: **Personnel Service, Cleveland VA Medical Center (Brecksville Unit), 10000 Breckaville Road, Brecksville, OH 44141.** Telephone **(216) 526-3030,** ext. 201, 202, 452.

1,000 SUNBELT OPENINGS

D.P. - ROBERT MONTGOMERY

Prog. Anal. (3 yrs H-P & COBOL)	to $28,000 NC location
Prog. Anal. (3 yrs Mfg. CICS & COBOL)	to $29,000 NC location
Prog. Anal. (3 yrs banking IMS & COBOL)	to 29,000 VA location
Sys. Prog. (3 yrs MVS or IMS)	to $40,000 SC location
Sys. Prog. (3 yrs NCP & VTAM)	to $40,000 FL location
Sys. Anal. (3 yrs ins. appl. & COBOL)	to $35,000 TN location

ENGINEERING - MIKE HUNTER

Systems Engineer(C3I)	to $70,000
Software Mgr's (Communications)	to $65,000
Software Supv. (Telephony)	to $60,000
Sr. Software Engr's (Unix-DEC or INTEL)	to $55,000
Software Engr's (Microprocessor)	to $50,000

Fox-Morris is the nations largest corporate owned co. with over 150 affiliates located throughout the nation. For a clear understanding of our clients needs call 919/872-2940 or send resume to:

FOX-MORRIS ASSOCIATES
3101 Poplarwood Court
Raleigh, NC 27625

DATABASE ANALYST/ PROGRAMMER III

Salary range: $33,075 - $37,207

Oakland County, Michigan, is presently seeking candidates for Database Analyst/Programmer III position within the Computer Services Department. The Computer Center houses two IBM 4341 CPU utilizing VM, CICS, IDMS, VSAM and an on-line network of over 300 terminals. Current applications are primarily related to County governmental operations. Applicants must possess a bachelor's degree from an accredited college or university with a major in computer science, data processing or a closely related field AND have had 3 years of database analysis and/or programming experience (additional experience may substitute for the bachelor's degree).

For further information or application package, please contact the Personnel Department:

OAKLAND COUNTY
1200 N. Telegraph
Pontiac, MI 48053
(313) 858-0530

Equal Opportunity Employer

IDEAS: We Make Them Happen.

Software Systems Laboratory...the Software House for Raytheon's Equipment Development Laboratories. We bring life — and intelligence — to a wide range of real-world systems: air traffic control, weapons direction, fire control, communications, missile guidance, tracking and data gathering, space surveillance, range instrumentation, plus an emerging set of laser applications.

We're looking for software engineers who want to explore their full potential developing a wide range of applications in a highly-charged, up-to-date environment. Join our outstanding team of software professionals, and you'll be creating the state of the art, not following it.

Software Systems Engineers

You'll be involved in front-end activities that translate system requirements into software performance specifications in the following areas:

- Requirements Analysis
- Software/Hardware Trade-offs
- Modeling of Critical Performance Characteristics
- Interface Definition
- Data Processing Architecture Definition
- Software Test Selection
- Performance Specification Preparation

These tasks are directly applicable to all of the following application areas listed.

Air Traffic Control Software Engineers

Several Air Traffic Control Program areas include existing and planned enroute and terminal ATC Systems, for both domestic and international applications: aircraft/controller digital communications and dynamic simulation/training.

- Radar Data Processing/Track File Management
- Flight Plan Processing
- Channel Management
- Intercomputer Communications
- Mosaicking

Assignments in the Washington, DC area also available.

Communications Systems Software Engineers

Focus here is on the development of advanced satellite communications terminals employing sophisticated microprocessor technology for processing and system control in the following areas:

- Antenna Pointing Systems
- Ephemeris Data Processing
- Multi-Access Algorithms
- Built-in Test and Diagnostics

Computer Diagnostics Software Engineers

You will design and develop advanced militarized computers employing the latest in technology for fault tolerant techniques and high speed architectural concepts. And also develop several general purpose militarized super minicomputers employing sophisticated built-in test circuitry and high speed parallel pipelined architectures.

- Micro and Macro Diagnostics for fault detection and isolation
- Automatic Test Systems
- Intelligent Control Panel System Development

Graphic Software Engineers

Develop real-time, interactive display software that will comprise the next generation of "user friendly" man/machine interfaces in radar, sonar, communications, air traffic control and image processing.

Radar Systems Software Engineers

Major software challenges exist in these areas:

- Radar Data Processing
- Object Classification and Discrimination
- Real-Time Control Systems
- Embedded Computer Systems
- System and Unit-Level Diagnostics

System Programmers

Major expansion of our System Software Department requires applicants in the following areas:

- Operating Systems, especially VMS, UNIX, and RSX11
- Languages, including "C," PASCAL, FORTRAN, JOVIAL/J73, and Ada
- Performance Measurement and Prediction Tools
- Real-Time Operating Systems Development
- Configuration Management Tools
- Networks and Communication Protocols

Positions require a degree in Engineering or Computer Science and at least 3 years of directly related experience. We are located in the Boston suburbs, an area that many consider to be the finest in the country in which to live and work. U.S. Citizenship not required for all positions.

Please direct your resume, including current salary, in strictest confidence to: Ann Doyle, Dept. CW, Raytheon Equipment Development Laboratories, 528 Boston Post Road, Sudbury, MA 01776.

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Telecommunications Administrator $45K

We are a major, privately held consumer products manufacturer, located in the SUBURBAN NEW YORK CITY AREA, seeking an individual with 5-10 years related experience to manage our telecommunications section, providing key input to office of the future technology.

The successful candidate will have hands-on, in-depth experience in voice and data communications including local area networks and network design.
Familiarity with ROLM equipment desirable.

If you have the qualifications for this highly-visible, new position on our Corporate MIS Staff, please send your resume, outlining your background and salary history, in strict confidence, to:

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$25,000 to $50,000
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PROGRAMMER/MANAGER

Under guidance of Director maintain/modify/enhance TOPS-20 operating system. Will be responsible for overseeing day-to-day operation of computer facility. Supervise staff of 5. Coordinate intro classes, interface with users and oversee vendor negotiations. Previous experience with TOPS-20 and PDP-11 assembler language. Knowledge of hardware design and debugging techniques. Familiar with VAX computer, UNIX internals and network protocols. Requires substantially more than 40 hours/week. Must work well under time-pressure. Submit detailed resume to:

Stanford University
Personnel-Ref. 21065
Attn: Art Wilson
Stanford, CA 94305
(415) 497-3117

Engineering Programmer

Sperry's Flight Systems operation is looking for an engineering programmer to debug, document and maintain computer programs to support engineering software development activity. An associates' degree in computer science or computer engineering and two years of scientific programming experience is required. Knowledge of Pascal and Univac Exec Control language is preferred.

With Sperry, you'll work for a strong industry leader while you enjoy a competitive salary and benefits package. To be considered, send your resume and salary information, in confidence, to Charlie Retts, #CW P-62A, Sperry, P.O. Box 21111 (W27B3), Phoenix, AZ 85036.

SPERRY

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EDP AUDIT PROFESSIONALS

Wang, the computer company leading in office automation with more than $1.5 billion in revenues, today stands #264 on the Fortune 500. And that's still just the beginning. Continued growth and expansion have created new opportunities for experienced EDP Audit Professionals to become part of our EDP Audit Function on a worldwide basis in positions involving approximately 30% domestic and international travel. Primary responsibilities will include the evaluation of controls for systems under development, existing application systems, and computer installations. Additionally, you'll provide technical assistance to the financial/operational staff and evaluate software packages.

Senior EDP Auditor

The successful candidate must possess a minimum of 5-8 years experience, with a computer audit background. Ideally, this experience would be supplemented by a public accounting background and several years in private industry in the EDP Audit Function. CISA preferred.

EDP Auditor

Opportunity to work on audits of application systems, technical systems and computer installations. To qualify, you'll need a minimum of 3-5 years experience in "Big 8" or internal audit, with computer audit assignments. CISA helpful.

Leading the way in benefits.

Wang offers one of the best benefit programs in the industry including profit sharing, stock bonus, long term stock option and stock purchase plans, company paid dental, medical and life insurance, tuition reimbursement, and our employee country club.

Contact us today.

Send your resume with salary history to Robert Dorion, M/S 5320E, Wang Laboratories, Inc., Dept. CW 213, 2 Elizabeth Drive, Chelmsford, MA 01821.

We are an affirmative action employer.

WANG

The Office Automation Computer People

DENVER POSITIONS

Data Processing services organization located in the southeast metropolitan Denver area has openings for:

Systems Programmers - Opportunities for persons with two or more years software internals experience with MVS, CICS, IMS DB/DC or IDMS DC/DB.

Information Systems - COBOL or PL/1 technical background with development experience in on-line, highly interactive data base oriented systems. IDMS or IMS experience desirable. Junior through senior level positions available.

Applications Specialists - MSA financial systems, including general ledger, payables, receivables. Openings at all levels for persons with experience in fully integrated systems, data entry through data management and reporting.

Persons qualified for any of the above positions are invited to send a resume and salary requirements in complete confidence to:

EMPLOYMENT MANAGER
P.O. Box 441171
AURORA, CO 80044

EOE M/F/V/H

We regret that we are not able to accept agency referrals.

PUBLICATION SYSTEMS SUPERVISOR

Callaghan and Company, an established legal publisher offers an excellent and challenging opportunity with substantial growth potential in our MIS Division.

We seek a results oriented individual with a strong background in project management and a sound knowledge of text processing system design and implementation to lead our WANG based development effort. Successful candidates will have minimum 6 years relevant technical experience in systems analysis and design, hardware and software package evaluation, proposal preparation and presentation, and hands-on development activity. We offer an outstanding benefits package including competitive salary. Please send resume and salary history in confidence to:

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Callaghan and Company
3201 Old Glenview Road
Wilmette, IL 60091

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NEW ENGLAND

Due to an Unprecedented Need by Outstanding N.E. Companies, We are Seeking Additional Skilled D.P. Professionals. Many Individuals Who Replied To Our Previous Ads are Now Enjoying the Benefits of Living and Working in New England while others are Currently Interviewing. Special Needs Include Experienced People on Sys. 38 (We have 20 Openings At Any Given Time), DEC VAX, IBM OS/MVS, and Realtime Software Engineers (Fortune 100 Client Currently Has 11 Openings). According to Leading Trade Journals N.E. is One Of The Fastest Growing Data Processing Regions in the U.S. Today. Start YOUR Year Out Right!

DATA POSITIONS
POSITIONS, INC., 117 Park Avenue, Suite 201, West Springfield, MA 01089 or Call Collect Bill Mallory (413) 781-3412

DATA PROCESSING

Sohio

San Francisco

SOHIO is combining talented and creative minds with advanced technology to further our continuing oil and gas exploration and production efforts. Our Scientific Systems Division seeks the following scientific computing professionals to provide vital support to our Western Region activities.

CDC Operating System Specialists

The candidates we seek must be knowledgeable on the internals of the CDC NOS 2.1 operating system on Cyber 865 and Cyber 740 computers. A minimum of three years' experience in NOS operating system support is required as is COMPASS assembly language programming. A degree in math or computer science is preferred.

VAX System Specialist

Qualified candidates will have experience with VAX/VMS operating system. You will support existing remote batch and PDP 11 workstations.

Sohio's search for the best technical talent is an integral part of our expansion strategy. Our facilities include a new data center, enabling Sohio to put the most advanced data processing technologies at your disposal. For immediate, confidential consideration for either of these opportunities, forward your resume with salary history TODAY to Judy Alter, Sohio Petroleum Company, S089, 50 Fremont Street, San Francisco, CA 94105. We are an equal opportunity employer M/F/H/V.

Your search leads to Sohio. SOHIO

INFORMATION SERVICES MANAGER

The City of Dubuque, Iowa (pop. 62,000) invites applications for the position of Information Services Manager to direct the data processing and word processing activities. Familiarity with Burroughs B-1000 equipment is desired and Cobol proficiency is required. Extensive experience in programming and systems design utilizing data base management, data communications and on-line batch and real-time systems is required. The successful applicant shall have graduated from an accredited college with a degree in computer science or related field; or any equivalent combination of experience and training. This is a management level position with an annual salary range of $26,582 - $35,630. Send resumes to the Personnel Manager, City Hall, 13th and Central, Dubuque, IA 52001 by February 28, 1984. Qualified persons with physical and mental impairments are encouraged to apply. Under Iowa law APPLICANT CONFIDENTIALITY CANNOT BE GUARANTEED.

AN EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION EMPLOYER

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SYS PROG MVS-DOS/VSE-VM/SP	$42,000
CICS COMM/MACRO	$38,000
CONSULTING	$37,000
BANKING SYSTEMS	$35,000
ME, NH, VT	$35,000
HP-3000/HONEYWELL	$33,000
RI, CONN	$33,000
RPG SYS-38/36/34	$32,000
METHODS ANALYST	$28,000
COBOL/PL-1/BASIC/MUMPS	$26,000

LEAHY & COMPANY

Personnel Consultants
88 Broad Street, Suite 301
Boston, Mass. 02110
Telephone (617) 423-4489

PROGRAMMER ANALYST II - STATISTICS AND METHODS ANALYSIS

Salary range: $23,889 - $27,654

Applicants must possess a bachelor's degree from an accredited college or university with a major in computer science, data processing or a closely related field AND have 2 years of programming and/or systems analysis experience (additional experience may substitute for the bachelor's degree).

For further information or application package, please contact the Personnel Department:

OAKLAND COUNTY
1200 N. Telegraph
Pontiac, MI 48053
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DIRECTOR OF THE OFFICE OF COMPUTER SERVICES

Rensselaer is seeking a Director of Computer Services who will provide innovative leadership in University computing and enhance the capabilities of our widely respected central computing service organization. Qualifications for this position include an understanding of and a strong commitment to research and academic computing; excellent interpersonal communications skills; extensive background in computer operating systems and hardware; a thorough understanding of data communications networking; demonstrated experience and ability in planning and budgeting; and a record of managerial accomplishments in the full service computing environment.

The director is responsible for strategic planning to insure that Rensselaer continues to provide advanced, high quality computing for research, instruction and computation. Leading the development and implementation of a university data network involving distributed computing, microcomputers and workstations, and coordinating the operations of central computing services are important facets of this challenging opportunity. Candidates should have a minimum of 8 years of relevant experience either in directing a university computing facility or having demonstrated leadership in academic computing or systems development. Applicants must have a Master's degree; a Doctorate is preferred.

The Office of Computer Services is comprised of an experienced and talented staff of 50. They support research, instruction, and a group of administrative and external users on an IBM 3081D with over 500 terminals connected.

Rensselaer is recognized for its strong commitment to computing excellence for faculty and students. RPI offers degree programs in Engineering, Science, Humanities and Social Sciences, Management and Architecture. These five schools enroll 4,700 undergraduates, 1,500 full-time and 500 part-time graduate students. The director will receive highly competitive remuneration and attractive benefits. Applicants are to forward a complete resume and include the names of three references. Confidentiality requirements of applicants will be strictly observed. Applications and supporting materials postmarked by March 15 will receive full consideration.

Candidates should send resumes and supporting materials to Dr. Gary Judd, Vice Provost, Rensselaer Polytechnic Institute, 110 8th St., Troy, NY 12181.

(RPI)
Rensselaer Polytechnic Institute
RPI is an equal opportunity/affirmative action employer

Data Processing

Systems Analysts/ Programmers

Key openings in several of NCR's expanding divisions

NCR, a world leader in the information processing industry, seeks strong achievers to complement our teams of marketing and support professionals in both our EFT and Data Services Division and Financial Systems Division–Commercial Bank and Thrift Systems.

Your credentials must include at least 2-5 years experience in commercial banking systems applications. Familiarity with CIF, CLASS, and BANKER 80 is desirable. Ideally, exposure to Assembly language, NEAT/3, and COBOL programming are assets. Up to 20% travel required.

As one of the most respected companies in the field, NCR offers competitive salaries, a comprehensive benefit program and an atmosphere where the challenge, reward and recognition are as great as any opportunity in the business world today.

You should have a technical or business degree with computer science courses. In lieu of a degree we will consider equivalent experience. If you are successful in your present postion and want to expand your potential, forward your resume and salary history to: Mr. Randy Neises, NCR Corporation, Dept. Q56, USDPG, USG-1, Dayton, Ohio 45479.

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Complete Computer Systems
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DATA PROCESSING OPPORTUNITIES

TRW Financial and Data Services Division offers you the opportunity to further your career in pleasant surroundings. We are currently seeking qualified individuals for the following positions:

IBM SYSTEMS PROGRAMMER
To work in the IBM Operating Systems Group. Primary responsibility will be to support the VM Operating System installed on an IBM 3081 processor. Should have working knowledge with both VM and CMS and be familiar with VM SYSGEN. Degree in Computer Science/Math/Engineering and 2 years experience required.

USER SUPPORT ANALYST – SCIENTIFIC
Will be involved in CDC consulting, teaching and authoring classes. Must be experienced in FORTRAN programming on CDC computers, and possess excellent analytic and communication skills. Degree in CS, Math, EE and 3 years experience desired.

PERFORMANCE ANALYST
To do performance measurement on MVS triplex computer configuration with shared DASD, IMS and TSO, and CAD/CAM application performance measurement. Reports design and implementation for performance tracking. Requires minimum BS in Computer Science or Math and 5 years performance/capacity analysis.

USER SUPPORT ANALYST – SCIENTIFIC
Consults with users to solve FORTRAN related programming problems on IBM. Designs and teaches classes. Requires minimum BS in Math, Computer Science or Engineering and 3 years FORTRAN applications in an IBM JCL environment.

LOCAL AREA NETWORK ANALYST
To work with team on interface technology with IBM network. Must be knowledgeable in MVS and network performance, capacity planning. Strong working knowledge of MVS internals and the VTAM interface to SNA Communications network. BSEE or Computer Science and 5 years experience.

USER SUPPORT ANALYST – BUSINESS
Will provide consultation, teaching and technical support to business areas. Will be involved in installation development and maintenance of software products. Experience in IBM Mainframe, VM/CMS, MVS/TSO, JCL. Requires minimum 3 years experience and BS degree in Computer Science.

TRW offers excellent salaries and an outstanding benefits plan that includes medical/dental/vision care and flexible working hours. For immediate consideration, send your resume in confidence to:

Bob Chambers
TRW Financial and Data Services Division
Bldg. E1/Room 4029
One Space Park
Redondo Beach, CA 90278

TRW

U.S. Citizenship Required
Equal Opportunity Employer

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REAL TIME PROGRAMMING SYSTEM

We are looking for a few young, bright, ambitious individuals who can substantiate their claim to at least one year's solid systems experience working with RPS. Plusses would be CM-1, SNA/SDLC or other communications experience. The work is varied and ranges from in-house design/development of new software products to on-site consulting/analysis/programming at customer locations.

Send detailed resume with salary history in confidence to:

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211 Sutter Street, 4th Floor
San Francisco, CA 94108

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Bob Stevens
Senior Vice President
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Pasadena, CA 91101

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Data Processing

CAREER OPPORTUNITIES AT DBMS, INC.

DBMS, Inc. is a highly regarded software product and professional services firm. We staff database experts in the areas of consulting, education, application systems, software development and technical support. We currently have openings in our Field Operations, Product Development and Technology groups.

SOFTWARE PRODUCT SALES

The Field Operations group has several openings for Sales Professionals with software or similar high technology product sales experience. These openings will be based in our regional offices.

DATABASE CONSULTANTS

We must also fill several openings in our Field Operations group for professionals with database expertise (IDMS experience preferred but not mandatory with ADS/O a plus). We have an established nationwide network of regional offices and immediate openings in most major North American cities. Some travel is required.

SOFTWARE ENGINEER

The Technology group has an opening for a software engineer to join in the research and development of a major software product. The product will provide an automated, interactive environment for the specification, generation and implementation of information systems. The position requires knowledge of multiple high level languages (PASCAL, PL/1, C, COBOL, etc.) and some Assembler. Other requirements include an exposure to database concepts with IDMS, IMS or a relational product and the ability to work well with peers in a team environment. Experience with formal software design techniques, microcomputers (Intel 8088/IBM-PC preferred), building system software in a product oriented environment and exposure to language translation techniques is highly desirable. MS or BS in Computer Science or a related discipline is also desirable.

Candidates for all positions should have proven ability to meet deadlines and a willingness to work independently in a demanding, dynamic environment. DBMS, Inc. offers an excellent salary and benefit package and will assist in relocation. If you have the ambition, flexibility, and qualifications, please send your resume today in complete confidence to:

Harry J. Pavela
Human Resources Manager

DBMS, Inc.
Corporate Offices
1801 Mill St., Naperville, IL 60540

Equal Opportunity Employer M/F

DBMS INC.

OPERATIONS PROFESSIONALS

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Four years of experience and a sound knowledge of either MVS,DOS or VM necessary. Any individual seeking an opportunity—not a job, with a strong background in operations should apply.

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Operations Services Division
100 W. Kennedy Blvd.
Suite 801
Tampa, FL 33602

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FACULTY POSITION

Tenure track faculty position starting August 20, 1984 in business oriented computer program offering BS and AAS degrees. Preference will be for holders of a master or doctorate degree in a computer related area with some applications and teaching experience. Should be able to teach in at least two of the following areas: Systems Analysis, CICS, Operating Systems or Programming Languages (COBOL, PL/1, RPG, BASIC, or BAL).

Deadline for applications: March 15, 1984.

Competitive salary and benefits; rank commensurate with qualifications and experience.

Purdue University Calumet is a 7500+ student, urban university located in NW Indiana approximately 25 miles SE of Chicago, in a heavily computerized industrial area.

Please send resume to: Prof. J.S. Quasney, Department Head ISCP, Purdue University Calumet, Hammond, IN 46323.

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COMPUTER SCIENCE FACULTY POSITIONS

Western Kentucky University invites applications for new faculty positions in Computer Science. Applicants should hold a Doctorate in the Computer Science field, or a related area with experience in the computer science field. Master's degrees will be considered for junior positions. Candidates should be qualified in one or more of the following areas: systems programming, data base theory, compilers, programming languages, data management systems, computer architecture, and operations research. Available Fall, 1984. Positions are open until filled.

Complete resume, official transcripts, and three letters of recommendation should be forwarded to the Vice-President for Academic Affairs, Computer Science Committee, Western Kentucky University, Bowling Green, Kentucky 42101.

An Affirmative Action/Equal Opportunity Employer

SHIPPENSBURG UNIVERSITY SHIPPENSBURG, PENNSYLVANIA

BUSINESS INFORMATION SYSTEMS SPECIALIST: Tenure-track position available August, 1984. Teach information systems courses and related computer courses at the undergraduate and graduate levels. Minimum requirements: ABD in a Ph.D. or D.B.A. in CIS program, background and interest in several of the following areas: database, systems analysis and design, programming languages, structured methodology, distributed processing. Appointment date: August 20, 1984. Submit letter of application and resume by March 15, 1984. Apply to Search Committee, Business Information Systems/Business Education Department, College of Business, Shippensburg University, Shippensburg, Pennsylvania 17257. Shippensburg University is an Equal Opportunity/Affirmative Action Employer.

ANALYST/PROGRAMMER

Professional position with City of Elgin, Illinois, for design and programming of municipal systems on IBM 3/15D. Minimum 3 years experience as Analyst/Programmer with working knowledge of RPG required. Compensation: $23,388-$28,680 plus benefits. Send resume by February 27, 1984 to:

Personnel Office
150 Dexter Court
Elgin, IL 60120

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Computerworld comes out every Monday and our deadline for receiving ads is 10 days (or six working days) prior to the issue date desired.

First time advertisers must send payment along with their first ad.

Our mailing address is:

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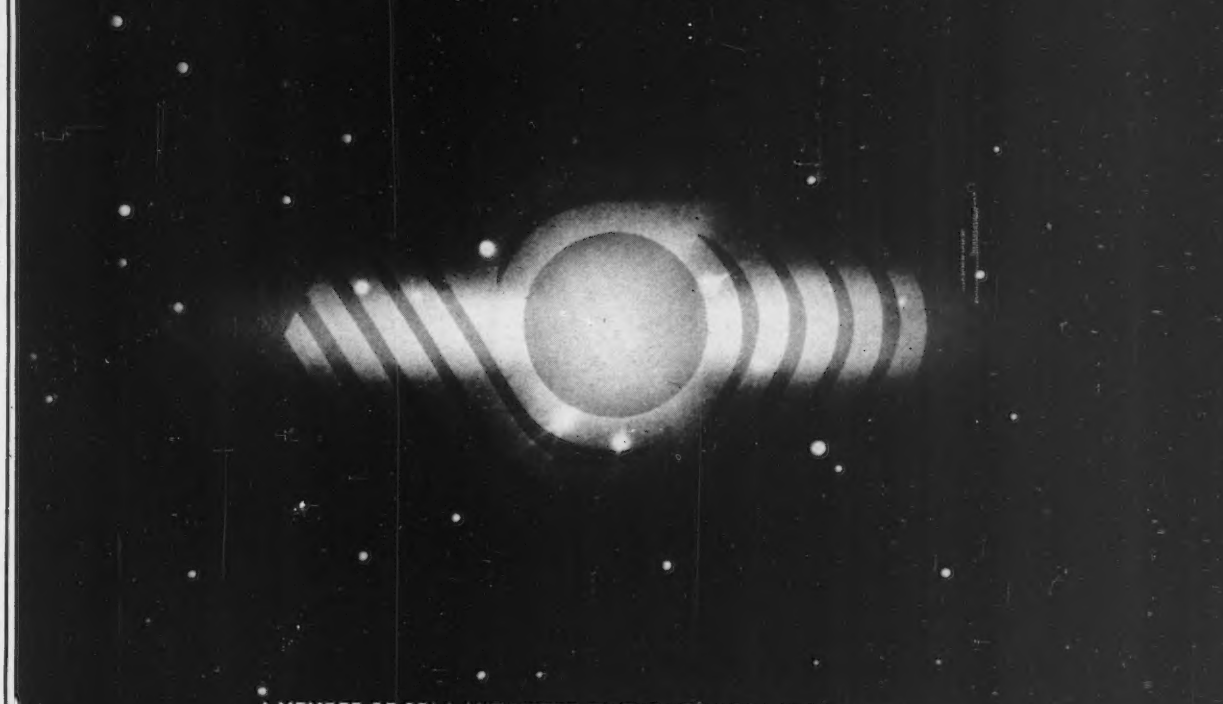

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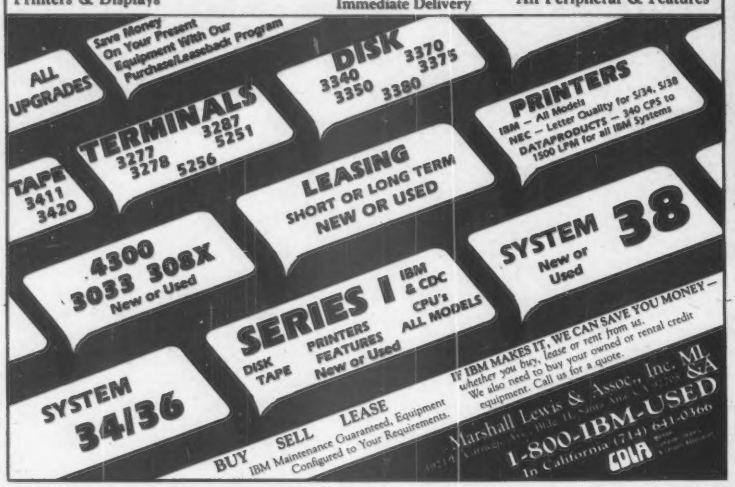

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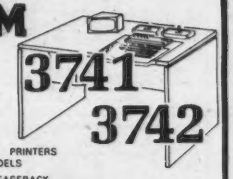

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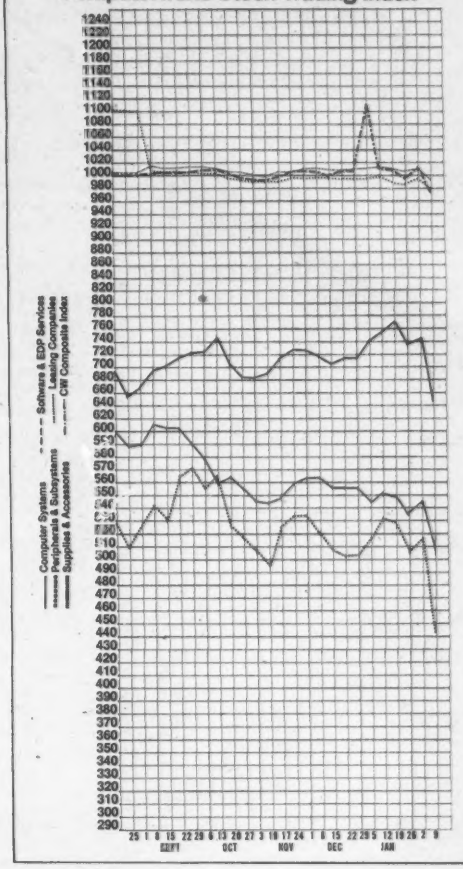
Computerworld Stock Trading Index



Computerworld Stock Trading Summary

TRADE QUOTES

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

CLOSING PRICES WEDNESDAY, FEBRUARY 8, 1984

E X C H		1983-84 RANGE (1)	CLOSE FEB 8 (1)	WEEK NET CHNGE 1984	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
O	ALPHA MICROSYSTEMS	11- 24	12 3/4	- 1	- 7.2
O	ALTOS COMPUTER SYST	8- 28	8	- 1 1/2	-14.2
A	AMDAHL CORP	8- 30	16 1/2	- 1 7/8	-10.2
O	APPLE COMPUTER INC	18- 83	23 1/4	- 1 3/8	- 5.5
N	AT&T	60- 70	64 1/8	- 1 5/8	- 2.4
N	BURROUGHS CORP	28- 58	47 3/8	- 4 7/8	- 9.3
O	COMPUTER AUTOMATION	6- 17	8	- 1/4	- 3.0
A	COMPUTER CONSOLES	8- 28	15 3/4	- 2 1/8	-11.8
N	CONTROL DATA CORP	21- 62	41	- 2 3/4	- 6.2
O	CONVERGENT TECHNOL	10- 41	17 3/4	- 2 3/4	-13.4
N	CRAY RESEARCH INC	20- 58	44 3/4	- 2 3/4	- 5.7
N	DATA GENERAL CORP	10- 47	38	- 2 1/8	- 5.1
N	DATAPOINT CORP	11- 36	21 5/8	- 3/8	- 1.7
N	DIGITAL EQUIPMENT	62-132	92 3/8	- 3 3/4	- 4.3
A	EECO INC	8- 18	12 1/2	- 1	- 7.4
N	ELECTRONIC ASSOC.	5- 15	8 1/2	- 3/8	- 5.4
N	FLOATING POINT SYST	18- 44	28 1/2	- 2 1/2	- 8.8
N	FOXBORO	22- 47	32 7/8	- 7/8	- 2.5
O	GENERAL AUTOMATION	3- 16	11 1/4	- 1 7/8	-14.2
N	GOULD INC	28- 44	28 7/8	- 3	- 9.4
N	HARRIS CORP	20- 51	35 1/8	- 3 5/8	- 9.3
N	HEWLETT-PACKARD CO	22- 48	38 1/2	- 1 1/2	- 3.7
N	HONEYWELL INC	28- 68	35 1/2	- 3 7/8	- 8.5
N	IBM	57-134	107 3/4	- 8	- 5.2
O	IPL SYSTEMS INC	3- 14	3	- 1/2	- 8.0
N	M/A-COM INC	17- 35	16 3/8	- 5/8	- 3.8
O	MAGNUSON COMP SYSTS	1- 5	3/8	0	0.0
N	MANAGEMENT ASSIST	7- 28	24	+ 1 3/8	+ 6.0
N	MATSUSHITA ELEC(ADR)	47- 88	77 1/4	- 8	- 7.2
N	MODULAR COMPUTER SYS	6- 18	7 7/8	- 1/2	- 5.9
N	MOHAWK DATA SCI	10- 19	13	- 1 7/8	-12.6
N	MOTOROLA INC	82-148	113 1/2	- 4	- 3.4
N	NAT'L SEMICONDUCTOR	13- 60	13 1/4	- 1	- 7.0
N	NBI INC	21- 91	23 1/8	+ 1	+ 4.5
N	NCR	39-135	105 1/2	- 7 3/4	- 6.8
N	PERKIN-ELMER	17- 37	25 3/8	- 1/2	- 1.9
N	PRIME COMPUTER INC	11- 30	17 5/8	- 1/4	- 1.3
N	SPERRY CORP	21- 50	38 3/4	- 5 1/2	-12.1
O	TANDEN COMPUTERS INC	14- 40	30 7/8	- 1 1/2	- 4.6
N	TANDY CORP	34- 83	33 3/4	- 1 1/8	- 3.2
O	TELEVIDEO SYSTEMS	11- 41	10 3/4	- 2 3/8	-18.0
O	TELXON CORP	8- 18	10 1/2	- 1	- 8.8
N	TEXAS INSTRUMENTS	71-178	123	- 4	- 3.1
A	ULTIMATE CORP	8- 24	13	- 2 1/4	-13.0
C	VECTOR GRAPHICS INC	2- 14	2	- 1/2	-20.0
A	WANG LABS "B"	13- 42	27 1/2	- 2 5/8	- 8.7
A	WANG LABS "C"	11- 42	27 1/4	- 2 3/4	- 9.1
N	XEROX CORP	35- 52	41	- 1 1/4	- 2.9
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	11- 37	35	- 1/4	- 0.7
N	COMDISCO INC	7- 42	11 1/8	- 1/8	- 1.1
O	CONTINENTAL INFO SYS	3- 16	8 3/4	- 1/4	- 3.5
N	DPF INC	5- 18	13 1/8	- 1/4	- 1.8
N	U.S. LEASING	18- 47	33 5/8	- 1 3/4	- 4.9
	COMPONENTS				
N	ADVANCED MICRO DEV	13- 37	28	- 2 3/8	- 8.3
O	ADV'D SEMICONDUCTOR	12- 38	23 3/4	- 5	-17.3
N	ANALOG DEVICES INC	18- 42	30 5/8	- 5/8	- 2.0
O	ANALOGIC CORP	15- 27	19 1/2	- 1/2	- 2.5
N	APPLIED MAGNETICS CP	10- 37	17 1/2	- 3 1/4	-15.8
N	TERADYNE	14- 38	27 5/8	- 2 3/8	- 7.9

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

E X C H		1983-84 RANGE (1)	CLOSE FEB 8 (1)	WEEK NET CHNGE 1984	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 8	3 1/2	- 1/4	- 6.6
O	ADVANCED SYSTEMS INC	8- 22	16 1/2	- 3/4	- 4.3
O	AGS COMPUTERS INC	7- 32	24	- 2 1/4	- 8.5
O	AMERICAN SOFTWARE	14- 31	14	- 1	- 6.6
N	AMACOMP INC	5- 23	4 7/8	- 7/8	-15.2
O	ANALYSTS INTL CORP	5- 20	9 1/2	- 1 1/2	-13.6
A	APPLIED DATA RES.	8- 27	23 1/2	- 5/8	- 2.6
O	ASK COMPUTER SYSTEMS	8- 21	14 3/4	- 2 1/4	-13.2
S	ASTRADYNE COMP IND	1- 7	2 3/8	0	0.0
N	AUTOMATIC DATA PROC	21- 44	34 3/4	- 5/8	- 1.7
O	CGA COMPUTER ASSOC	5- 17	9 5/8	- 1/4	- 2.5
O	COMPUTER ASSOC INT'L	8- 35	21	- 2 3/4	-11.5
O	COMPUTER HORIZONS	8- 20	10 3/4	- 1 3/4	-14.0
O	COMPUTER NETWORK	4- 10	7 1/2	- 1/8	- 1.6
N	COMPUTER SCIENCES	11- 23	17 1/2	- 1	- 5.4
O	COMPUTER TASK GROUP	8- 22	14 1/4	+ 1/2	+ 3.6
O	COMPUTER USAGE	2- 22	8	- 2	-18.1
O	COMPUTONE SYSTEMS	5- 28	7	- 1/4	- 3.4
O	CONSERV CORP	5- 20	5 7/8	- 3/8	- 5.8
O	CONSHARE	7- 14	9 3/8	- 3/4	- 7.4
N	CULLINET SOFTWARE	12- 50	31 3/4	- 2 1/8	- 6.2
O	CYCARE SYSTEMS INC	8- 27	18 3/4	0	0.0
N	ELECTRONIC DATA SYST	10- 42	27	- 1	- 3.5
O	HOGAN SYSTEM INC	18- 27	15 1/2	- 2 3/8	-13.2
N	GENERAL ELECTRIC CO	45- 98	92 3/8	- 1 5/8	- 2.8
N	GTE CORP	38- 48	40 1/2	- 2 3/4	- 6.3
N	INFORMATICS INC	10- 34	19 3/4	- 1	- 4.8
O	INFOTRON SYSTEMS COR	25- 43	31 1/4	+ 3/4	- 2.3
O	KEANE ASSOCIATES	4- 15	7 3/4	- 1/4	- 3.1
A	LOGICON	8- 31	28 3/8	- 1/2	- 1.8
O	MCI COMMUNICATIONS	10- 34	10 3/8	- 1 5/8	-13.5
O	MNGT SCI AMER INC	8- 33	17 3/4	- 1 3/4	- 8.8
O	MATHEMATICAL APP GRP	10- 22	8 1/2	- 1/2	- 5.0
O	MICOM SYSTEMS INC	25- 50	32	- 1/2	- 1.2
O	MONCHIK-WEBER CP	8- 22	6 1/4	- 1/2	- 7.4
O	NATIONAL DATA CORP	5- 26	18 1/8	- 7/8	- 4.6
O	ON-LINE SOFTWARE INT	11- 27	11	- 3 1/2	-24.1
O	PANSOPHIC SYSTEMS	8- 30	16 1/2	- 3/8	- 2.2
N	PLANNING RESEARCH	8- 21	15 1/4	- 1/2	- 3.1
O	POLICY MGMT SYSTS CP	15- 39	24	- 1	- 3.9
O	PROGRAMMING & SYS	1- 8	4 5/8	0	0.0
O	REYNOLDS & REYNOLD	17- 53	32 3/4	- 1 1/4	- 3.6
O	SEI CORP	11- 34	18 3/4	- 2	- 8.1
O	SHARED MEDICAL SYST	13- 43	28 5/8	- 1 3/4	- 5.8
O	SCIENTIFIC COMPUTERS	8- 14	10	- 1 1/4	-11.1
O	SOFTWARE AG	5- 17	11 5/8	- 3/8	- 3.1
N	TYMSHARE INC	12- 30	16 3/8	- 2 3/4	-14.3
A	URS CORP	5- 18	13	- 3/4	- 5.4
N	WYLY CORP	7- 17	9 7/8	- 3/4	- 7.0
	PERIPHERALS & SUBSYSTEMS				
P	AM INTERNATIONAL	2- 7	3 7/8	- 1/8	- 4.5
A	ANDERSON JACOBSON	5- 26	8 3/4	- 5/8	- 6.6
O	AUTO-TROL TECHNOLOGY	8- 28	18 3/4	- 1 3/4	- 8.5
O	BANCTEC INC	7- 33	11 1/4	- 1 3/8	-10.8
A	BEEHIVE INT'L	4- 15	7	- 1/2	- 6.6
N	BOLT,BERANEK & NEW	5- 30	18 7/8	- 2 1/8	-10.1
O	CAMBEX CORP	1- 4	2	+ 1/8	+ 6.6
N	CENTRONICS DATA COMP	6- 28	13 1/4	- 2	- 13.1
A	CETEC CORP	4- 12	8 3/8	- 1	- 10.3
O	COGNITRONICS	2- 20	9 1/4	- 1 1/8	- 10.8
O	COMPUTER DEVICES INC	1- 21	1/2	- 1/4	-35.8
O	COMPUTER TRANSCEIVER	3- 12	3 1/4	- 3/4	-18.7
N	COMPUTERVISION CORP	18- 53	28 7/8	- 3 1/4	- 8.6
N	CONRAC CORP	16- 38	15 1/2	- 3/8	- 2.3
A	DATAPRODUCTS CORP	18- 41	23 1/8	- 3 1/2	-13.1
A	DATARAM CORP	3- 12	6 5/8	- 1/4	- 3.6
O	DATA SWITCH CORP	13- 41	18 1/2	- 7	- 28.4
O	DATUM INC	2- 17	8 3/4	- 3/4	-10.0
O	DECISION DATA COMPUT	3- 18	6 7/8	- 1 3/8	-13.6
O	DOCUTEL-OLIVETTI	11- 38	12 1/2	- 2	-13.7
N	ELECTRONIC M & M	5- 11	6 3/8	- 3/8	- 5.3
O	ENDATA, INC	11- 18	11 1/4	- 1/4	- 2.1
O	EVANS & SUTHERLAND	18- 50	20	- 4	-16.6
O	GANDALF TECHNOLOGIES	9- 22	10 7/8	- 1/8	- 1.1
N	GEN'L DATA COMM IND	6- 33	27	- 3 1/8	-10.3
O	GREAT SOUTHWEST IND	1- 8	3/4	0	0.0
N	HAZELTINE CORP	7- 31	20 7/8	- 2 5/8	-11.1
O	ICOT CORP	3- 10	3 5/8	- 1/2	-12.1
O	INFORMATION INTL INC	10- 22	11 1/4	- 1	- 8.1
O	INFORMATION SCIENCE	12- 17	13	- 1/2	- 3.7
O	INTEL CORP	11- 45	31 1/2	- 4	-11.2
O	IPL SYSTEMS INC	3- 14	3	- 1/2	- 8.0
A	LUNDY ELECTRONICS	7- 18	10 1/8	+ 1/8	+ 1.2
O	MEGADATA CORP	8- 15	10 3/4	- 1/2	- 4.4
A	MEI DATA CORP	18- 37	17 5/8	- 3/4	- 4.0
N	NASHUA CORP	8- 28	21 3/4	- 1 3/8	- 5.8
O	NETWORK SYSTEMS CORP	8- 34	18 3/8	- 1 7/8	- 9.2
N	NO AMERICAN PHILIPS	47- 78	68 1/4	- 4 1/2	- 6.2
O	NORTHERN TELECOM LTD	22- 48	34 1/4	+ 7/8	+ 2.6
O	ONEX	1- 8	1 1/4	- 1/2	-28.5
N	PARADYNE CORP	14- 30	14 1/4	- 7/8	- 5.7
A	PENRIL CORP	7- 14	11 3/8	- 3/8	- 3.2
O	PHOENIX AMERICAN INC	7- 17	8 1/4	- 1/4	- 2.9
N	PLESSEY CO (ADR)	26- 41	29 1/2	- 1 1/8	- 3.6
O	PRINTRONIX INC	20- 34	20	- 4	-16.8
O	RAMTEK CORP	9- 18	10	- 3/4	- 6.8
N	RAYTHEON CO	41- 58	41	- 3 1/2	- 7.8
N	RECOGNITION EQUIP	4- 17	12 1/4	+ 1/8	+ 1.0
N	ROLM CORP	40- 80	40 5/8	- 1 5/8	- 3.8
N	SANDERS ASSOCIATES	38-120	38	- 6 1/8	-14.3
O	SCAN DATA	1- 3	3/8	0	0.0
O	SCAN-TRON CORP	12- 19	15	- 1	- 6.2
N	SCIENTIFIC ATLANTA	12- 23	11 7/8	- 1 1/8	- 8.6
N	STORAGE TECHNOLOGY	11- 33	12 1/4	+ 1 1/8	+ 10.1
O	SYKES DATATRONICS	4- 27	3 7/8	0	0.0
O	SYSTEMS & COMP TECH	22- 38	22	- 1/2	- 2.2
A	T BAR INC	7- 17	8 3/4	0	0.0
O	TAB PRODUCTS CO	8- 30	23 3/4	+ 1/8	+ 0.5
O	TANDON CORP	14- 35	14 1/4	- 1 1/8	- 7.3
A	TEC INC	8- 12	8 3/4	- 1/8	- 1.4
N	TEKTRONIX INC	34- 87	64 3/4	- 2	- 2.9
N	TELEX	5- 32	21 1/4	- 2 1/2	-10.5
O	TESDATA SYSTEMS CP	3- 17	6 1/4	- 3/8	- 5.6
N	TIMEPLEX INC	7- 28	16 5/8	- 1 3/8	- 7.6
O	VISUAL TECHNOLOGY	8- 28	13 1/2	- 3 1/2	-20.5
	SUPPLIES & ACCESSORIES				
N	AMERICAN BUS PRODS	7- 23	18 3/8	- 3/4	- 3.8
N	BARRY WRIGHT	13- 33	27 3/8	- 7/8	- 3.0
A	DUPLEX PRODUCTS INC.	12- 27	28	- 1/8	- 0.4
N	ENNIS BUS. FORMS	8- 28	21 3/8	- 1 1/2	- 6.5
N	3M COMPANY	49- 80	77 1/4	+ 1/4	+ 0.3
N	MOORE CORP LTD	28- 51	41 3/4	- 1/2	- 1.1
O	STANDARD REGISTER	11- 34	30 3/4	+ 1/2	+ 1.6
N	WALLACE BUS FORMS	11- 33	29 3/8	+ 3/8	+ 1.3

15 pointed questions to ask MSA or any software supplier

These questions will help you when you sit down with individual software companies.

They're tough questions. Relevant ones. And any supplier who is worth his salt should be able to answer them without backpedaling.

Ask MSA

We'll answer all these questions to your satisfaction—plus any others you may have.

In fact, we're probably the best equipped to answer them. Because MSA is *the* software company. We offer the most complete line of totally integrated systems in the software industry, including financial, human resource and manufacturing.

So you avoid the headache of trying to tie together individual systems. (And the even bigger headache of adding to them.)

With MSA's integrated systems, there's no unnecessary duplication of data or effort. Reporting is faster. All your company's information is more timely and accurate—and in the right form.

Our technical edge comes from experience

Staying ahead is easier for a company that's steeped in software technology. MSA has spent years developing, refining, testing and enhancing our systems.

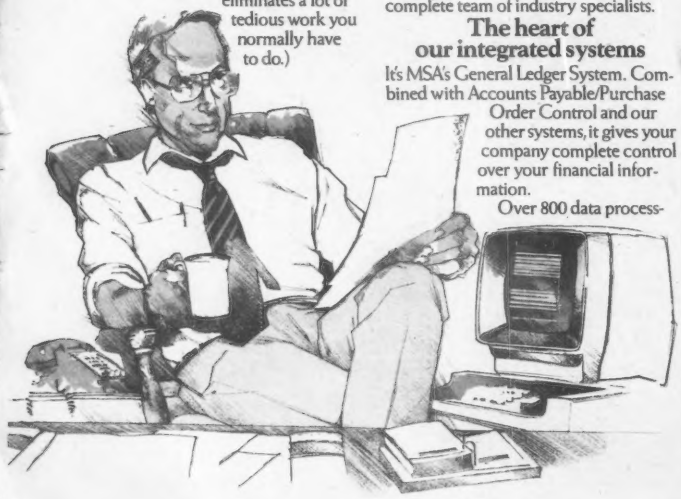
This year alone, we'll invest $25 million to make sure all our systems are technologically razor sharp. That gives us a decided advantage over flash-in-the-pan technology that may not have the bug-free logic of a more experienced system.

It also gives you a decided advantage over "custom" systems you have to update yourself.

MSA relieves you of that time-consuming burden. We update and enhance your software for a full year. Then we continue this service for a surprisingly low annual fee.

Maintenance includes keeping your system up-to-date technologically. Enhancing it with new features that make it work even harder for you.

And making sure it reflects changes in accounting procedures and government regulations, including 401(k), TEFRA, and FAS52. (That eliminates a lot of tedious work you normally have to do.)



Save this box. It can help you make an intelligent software decision.

1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using —and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure our own people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will we have to pay a lot to revamp it? Or even regenerate it?

35,000 days of training

At MSA, we make sure your people have a firm grasp of our systems. Last year alone, we conducted more than 35,000 student days of customer training for over 1,800 companies. At education centers all over the world, as well as at our headquarters.

From training sessions to cassettes to complete, easy-to-understand documentation, MSA provides the most extensive Customer Education Programs in the industry.

And MSA systems are just as friendly as our people. Our online HELP feature actually guides users through our systems, and EASY-SCREEN™ lets them design their own screens without creating data processing nightmares.

If there's ever a question or problem with our systems, MSA customers are always close to service.

Our Account Managers are knowledgeable, responsive, and backed by a complete team of industry specialists.

The heart of our integrated systems

It's MSA's General Ledger System. Combined with Accounts Payable/Purchase Order Control and our other systems, it gives your company complete control over your financial information.

Over 800 data processing specialists, accountants, and financial experts work together to make MSA's financial systems the most advanced and most highly integrated in the industry.

MSA has the answers

Whatever your size—whatever your business—MSA has a total software solution.

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